

SG04/00023



**REGISTRY OF PATENTS
SINGAPORE**

This is to certify that the annexed is a true copy of following application as filed with the Registry.

Date of Filing : 21 AUG 2003

Application Number : 200304490-6

Applicant(s) /
Proprietor(s) of Patent : NUTEK PRIVATE LIMITED

Title of Invention : ELECTRICAL POWER DISTRIBUTION
APPARATUS

BEST AVAILABLE COPY

Sandra Lynn Merinda (Ms)
Assistant Registrar
for REGISTRAR OF PATENTS
SINGAPORE

27 JAN 2004

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH
RULE 17.1(a) OR (b)



G00001

PATENTS FORM 1

Patents Act
(Cap. 221)
Patents Rules
Rule 19

INTELLECTUAL PROPERTY OFFICE OF SINGAPORE**REQUEST FOR THE GRANT OF A PATENT UNDER
SECTION 25**

101101

* denotes mandatory fields

1. YOUR REFERENCE*

SPS761

**2. TITLE OF
INVENTION***

ELECTRICAL POWER DISTRIBUTION APPARATUS

3. DETAILS OF APPLICANT(S)* (see note 3)

Number of applicant(s)

1

(A) Name

Nutek Private Limited

Address

39, Joo Koon Circle
Singapore 629105

State

Country

SG

For corporate applicant

For individual applicant

State of incorporation

State of residency

Country of incorporation

SG

Country of residency

SG

 For others (please specify in the box provided below)

03-AUG-21 16:29

(B) Name

CHIAKIO
SOI

Address

Country

State



Page 1 of 5



For corporate applicant

For Individual applicant

State of incorporation

State of residency

Country of incorporation

Country of residency

For others (please specify in the box provided below)

(C) Name

Address

State

Country

For corporate applicant

For Individual applicant

State of incorporation

State of residency

Country of incorporation

Country of residency

For others (please specify in the box provided below)

Further applicants are to be indicated on continuation sheet 1

4. DECLARATION OF PRIORITY (see note 5)

A. Country/country designated

DD MM YYYY

File number

Filing Date

B. Country/country designated

DD MM YYYY

File number

Filing Date

Further details are to be indicated on continuation sheet 6

5. INVENTOR(S)* (see note 6)

A. The applicant(s) is/are the sole/joint inventor(s)

Yes

No

B A statement on Patents Form 8 is/will be furnished Yes No

6. CLAIMING AN EARLIER FILING DATE UNDER (see note 7)

section 20(3) section 26(6) section 47(4)

Patent application number

DD MM YYYY

Filing Date

Please mark with a cross in the relevant checkbox provided below
(Note: Only one checkbox may be crossed.)

Proceedings under rule 27(1)(a) DD MM YYYY

Date on which the earlier application was amended

Proceedings under rule 27(1)(b)

7. SECTION 14(4)(C) REQUIREMENTS (see note 8)

Invention has been displayed at an international exhibition. Yes No

8. SECTION 114 REQUIREMENTS (see note 9)

The invention relates to and/or used a micro-organism deposited for the purposes of disclosure in accordance with section 114 with a depositary authority under the Budapest Treaty.

Yes No

9. CHECKLIST*

(A) The application consists of the following number of sheets

I.	Request	<input type="text" value="5"/>	Sheets
II.	Description	<input type="text" value="28"/>	Sheets
III.	Claim(s)	<input type="text" value="5"/>	Sheets
IV.	Drawing(s)	<input type="text" value="32"/>	Sheets
V	Abstract (Note: The figure of the drawing, if any, should accompany the abstract)	<input type="text" value="1"/>	Sheets
Total number of sheets		<input type="text" value="71"/>	Sheets

(B) The application as filed is accompanied by:

Priority document(s) Translation of priority document(s)

Statement of inventorship
& right to grant International exhibition certificate**10. DETAILS OF AGENT (see notes 10, 11 and 12)**

Name

Firm

LLOYD WISE

11. ADDRESS FOR SERVICE IN SINGAPORE* (see note 10)

Block/Hse No.

Level No.

Unit No./PO Box

Street Name

P.O BOX 636

Building Name

TANJONG PAGAR POST OFFICE

Postal Code

910816

12. NAME, SIGNATURE AND DECLARATION (WHERE APPROPRIATE) OF APPLICANT OR AGENT* (see note 12)
(Note: Please cross the box below where appropriate.)

I, the undersigned, do hereby declare that I have been duly authorised to act as representative, for the purposes of this application, on behalf of the applicant(s) named in paragraph 3 herein.

Name and Signature/LLOYD WISE

DD MM YYYY

21 08 2003

Our Ref SP576102 doc

NOTES:

1. This form when completed, should be brought or sent to the Registry of Patents together with the rest of the application. Please note that the filing fee should be furnished within the period prescribed.
2. The relevant checkboxes as indicated in bold should be marked with a cross where applicable
3. Enter the name and address of each applicant in the spaces provided in paragraph 3.
Where the applicant is an Individual
 - Names of individuals should be indicated in full and the surname or family name should be underlined.
 - The address of each individual should also be furnished in the space provided.
 - The checkbox for "For individual applicant" should be marked with a cross.
- Where the applicant is a body corporate
 - Bodies corporate should be designated by their corporate name and country of incorporation and, where appropriate, the state of incorporation within that country should be entered where provided.
 - The address of the body corporate should also be furnished in the space provided.
 - The checkbox for "For corporate applicant" should be marked with a cross
- Where the applicant is a partnership
 - The details of all partners must be provided. The name of each partner should be indicated in full and the surname or family name should be underlined.
 - The address of each partner should also be furnished in the space provided
 - The checkbox for "For others" should be marked with a cross and the name and address of the partnership should be indicated in the box provided.
4. In the field for "Country", please refer to the standard list of country codes made available by the Registry of Patents and enter the country code corresponding to the country in question.
5. The declaration of priority in paragraph 4 should state the date of the previous filing, the country in which it was made, and indicate the file number, if available. Where the application relied upon in an International Application or a regional patent application e.g. European patent application, one of the countries designated in that application [being one falling under section 17 of the Patents Act] should be identified and the country should be entered in the space provided.
6. Where the applicant or applicants is/are the sole inventor or the joint inventors, paragraph 5 should be completed by marking with a cross the 'YES' checkbox in the declaration (A) and the 'NO' checkbox in the alternative statement (B). Where this is not the case, the 'NO' checkbox in declaration (A) should be marked with a cross and a statement will be required to be filed on Patents Form 8.
7. When an application is made by virtue of section 20(3), 26(6) or 47(4), the appropriate section should be identified in paragraph 6 and the number of the earlier application or any patent granted thereon identified. Applicants proceeding under section 26(6) should identify which provision in rule 27 they are proceeding under. If the applicants are proceeding under rule 27(1)(a), they should also indicate the date on which the earlier application was amended.
8. Where the applicant wishes an earlier disclosure of the invention by him at an International Exhibition to be disregarded in accordance with section 14(4)(c), then the 'YES' checkbox at paragraph 7 should be marked with a cross. Otherwise, the 'NO' checkbox should be marked with a cross.
9. Where in disclosing the invention the application refers to one or more micro-organisms deposited with a depository authority under the Budapest Treaty, then the 'YES' checkbox at paragraph 8 should be marked with a cross. Otherwise, the 'NO' checkbox should be marked with a cross. Attention is also drawn to the Fourth Schedule of the Patents Rules
10. Where an agent is appointed, the fields for "DETAILS OF AGENT" and "ADDRESS FOR SERVICE IN SINGAPORE" should be completed and they should be the same as those found in the corresponding Patents Form 41. In the event where no agent is appointed, the field for "ADDRESS FOR SERVICE IN SINGAPORE" should be completed, leaving the field for "DETAILS OF AGENT" blank.
11. In the event where an individual is appointed as an agent, the sub-field "Name" under "DETAILS OF AGENT" must be completed by entering the full name of the individual. The sub-field "Firm" may be left blank. In the event where a partnership/body corporate is appointed as an agent, the sub-field "Firm" under "DETAILS OF AGENT" must be completed by entering the name of the partnership/body corporate. The sub-field "Name" may be left blank.
12. Attention is drawn to sections 104 and 105 of the Patents Act, rules 90 and 105 of the Patents Rules, and the Patents (Patent Agents) Rules 2001.
13. Applicants resident in Singapore are reminded that if the Registry of Patents considers that an application contains information the publication of which might be prejudicial to the defence of Singapore or the safety of the public, it may prohibit or restrict its publication or communication. Any person resident in Singapore and wishing to apply for patent protection in other countries must first obtain permission from the Singapore Registry of Patents unless they have already applied for a patent for the same invention in Singapore. In the latter case, no application should be made overseas until at least 2 months after the application has been filed in Singapore, and unless no directions had been issued under section 33 by the Registrar or such directions have been revoked. Attention is drawn to sections 33 and 34 of the Patents Act.
14. If the space provided in the patents form is not enough, the additional information should be entered in the relevant continuation sheet. Please note that the continuation sheets need not be filed with the Registry of Patents if they are not used.



...000000



...000000

ELECTRICAL POWER DISTRIBUTION APPARATUS

Background and Field of the Invention

5

This invention relates to an improvement for electrical power distribution apparatus more particularly to an apparatus enabling an electrical power supply to be provided to an electrical power point.

- 10 The conventional system of electrical power distribution in domestic and commercial environments is provided by power points which are installed in a wall cavity or a surface mounted power outlet at predetermined places. The location of such power points needs to be chosen in advance and often subsequent requirements can mean that the power points are provided in the wrong location and/or in insufficient numbers.
- 15

It is an object of the invention to provide a more flexible electrical power distribution apparatus.

- 20 Summary of the Invention

- 25 According to the invention in a first aspect, there is provided electrical power supply distribution apparatus comprising a conduit including at least one elongate conductor, the conduit having an opening through which a connector is able to be inserted to connect electrically with the conductor; a plurality of

conductive members disposed between the opening and the conductor, each conductive member being separately supported and resiliently displaceable by a said connector to provide access to the conductor.

- 5 With the conductive member separately supported, this allows each conductive member to be individually displaced by a connector. This provides a modular conductive member which allows easier assembly and replacement.

Preferably, the apparatus further comprises a plurality of resilient support members so that each conductive member being separately supported by a resilient support member.

- 10
- 15

Preferably, the conductive member forms an earth connector and is resiliently biased by the support member towards and/or occludes and/or seals the opening and the apparatus may further comprise a displaceable flap for the opening, the conductive member underlying the flap.

Preferably, the plurality of conductive elements are spaced apart from each other. The conductive member may have a sheet-like surface and a side portion which engages the support member. The conductive member may further comprise two opposed side portions and the or each portion is of winged form.

- 20
- 25

Preferably, each support member has side sections corresponding to the winged portions of the conductive member.

The support member may further comprise a support portion for supporting a said conductive member and a base connected to the support portion, whereby the support portion is resiliently displaceable towards the base. Preferably, the
5 support member has one or two resilient portions extending towards the base.

Either one or both resilient portions may have a central void and a depression facing the base. The base may have an abutment surface arranged to engage the depression. The abutment surface thus biases the resilient portions away
10 from the base. Preferably, the resilient portion is oval-shaped. The resilient portions provide a further "spring effect" within the support member.

The support member may be formed from plastic material and may comprise means to align the support member with a like support member. In the
15 described embodiment, the alignment means is in the form of a lug and a corresponding slot for receiving a said lug of a like support member.

The support member may also include means for connecting to the conductive member. Preferably, the connection means is in the form of a catch.
20 Alternatively or additionally, the conductive member may include means for connecting to the support member. Preferably, the connection means is in the form of a clip.

Preferably, the apparatus comprises an elongate tray for receiving the plurality of support members. The tray may be formed from conductive material so that the tray can be electrically connected to each conductive element.

- 5 Preferably, the tray comprises a plurality of spaced arched strips, each strip being arranged to locate within a slot of a said support member.

Brief Description of the Drawings

- 10 Embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a three dimensional view of a track of a first embodiment of power supply apparatus of the invention;

15

Figure 2 is an enlarged view of a track section of the embodiment of Fig. 1 showing a power point connector connected to the track section;

Figure 3 is a view of the track section in direction of the arrow A of Fig. 2;

20

Figure 4 is an underneath three-dimensional view of the track section of Fig. 2;

Figure 5 is an exploded perspective view of part of the track section of Fig. 2;

- 25 Figure 6 is an underneath view of the earth spring of Fig. 5;

Figure 7 is a cross-sectional view of a track section similar to that shown in Fig. 3 and which forms a second embodiment of the invention;

5 Figure 7a is a cross-sectional view of a variation of the second embodiment of the track section shown in Fig. 7 and which forms a third embodiment of the invention;

Figure 8 is an exploded perspective view of the power point connector shown in
10 Fig. 2;

Figure 9a is an assembled view of the connector of Fig. 8 in the first position in
which connector is inserted into the slot in the track section and Fig. 9b being a
similar view of the connector in a second position where the connector engages
15 electrical conductors and earth spring of the track section which are also shown.

Figure 10 is a part-section perspective view of the track section and power point
connector of Fig. 9a, with the connector having been inserted into the track
section;

20

Figure 11 is a view similar to Fig. 10 showing the power point connector rotated
to engage the electrical conductors of the track section;

Figure 12 shows an electrical plug which can be used to connect directly to the
25 track section of Fig. 1 without using the power point connector of Fig. 8;

Figure 13 and 14 shows different perspective views of an internal structure of the electrical plug of Fig. 12;

5 Figure 15 shows a bottom perspective view of the electrical plug of Fig. 12 illustrating a contact arm with ends covered by two protection members;

Figure 16 shows the same view of Fig. 15 with the contact arm rotated;

10 Figures 17 and 18 illustrate cross section views of a further embodiment of a track section which includes a different conductive member as the earth spring;

Figure 19 shows a preferred embodiment of the conductive member of Figure 17;

15

Figure 20 shows an exploded view of the conductive member of Figure 19;

Figures 21 to 24 are different views of a support module of the conductive member of Figure 20;

20

Figures 25 and 26 illustrate different views of a support tray of the conductive member of Figure 20;

25 Figure 27 is a perspective view of the support member of Figure 20 illustrating four modules of the support member being displaced;

Figure 28 is a side view of the support member of Figure 27;

Figure 29 shows how an electrical plug of Fig. 15 is used to displace the
5 conductive and support members of Fig. 27 to gain access to the conductors in
the track section;

Figure 30 shows a simplified view of the arrangement of Fig. 29 with some of
the components of the track section removed; and

10

Figure 31 illustrates a perspective view of Fig. 30.

Detailed Description of the Preferred Embodiments

15 With reference to Figs. 1 and 2, general views of the elements of an embodiment of the apparatus of the invention are shown. The apparatus provides a means for selecting a position in which power points may be placed thus allowing flexibility in position and/or number of power points which may be provided. A track is shown in Fig. 1 and comprises a plurality of identical track sections 100, each having a slot 110, connected together by means of joints 200 - 260 and end connectors 280, 300. Within the connectors 200 - 300 are provided power supply/connection units described hereafter which connect the track as a whole to the electrical mains supply and provide electrical continuity between track sections 100. Joint 240 also provides an interface to data and/or communication cables which run through the track as will be described below.
20
25

At any point along slots 110, one or more power point connector(s) 400 may be engaged with a track section 100 to provide a supply connection between the power supply connected to the track and a device to be plugged into the or each connector 400.

5

With reference to Figs. 2 – 6 a track section 100 is shown in more detail and comprises a conduit formed from an elongate extruded plastics base 120 which includes cavities 122, 124 each for receiving an elongate cylindrical conductor 126, 128, each cavity 122, 124 being provided with arcuate portions for engaging the sides of each conductor 126, 128 in a snap-fit arrangement. First and second cover members 130, 132 which clip to base member 120 via formations 134, 135, 136, 138, 139, 140 are also provided. The cover members 130, 132 together with portions 142, 144 of the base member 120 form elongate enclosures 146, 148 which provide cable runs. The cavities 122, 124 together meet in a central cavity 150 which has an opening forming the elongate slot 110. The cover members 130, 132 are provided with elongate deformable plastic flaps 154 which provide a cover for the slot 110.

An earth spring 160 formed from flexible, resilient conductive material is provided in the cavity 150. The earth spring 160 is connectable to earth and has a flat, elongate, sheet-like central portion 162 with wings 164, 166 projecting arcuately away from the portion 162. Each wing 164, 166 is divided into a plurality of wing members 168, 170 individually attached to the portion 162 as shown in Fig. 6. The wings 164, 166 rest in elongate slots 172, 174 which hold the ends of the wings in position. The surface 162 projects

outwardly to cover slot 110 just below flaps 154. The cavities 122, 124 further have projecting edges 176, 178 which engage the sides of wings 164, 166 and provide further support for the earth spring 160. The earth spring 160 is locally resiliently displaceable from the position shown in Fig. 2 to a position in which
5 the central portion 162 is depressed downwardly to, in the limit, abut against a projection 152 of the base 120. In this position, the ends of the wings 164, 166 remain in the elongate slots 172, 174. The earth spring 160 in this position allows access to the electrical conductors 126, 128 by the power point connector 400.

10

Each portion 142, 144 is provided with a plurality of openings 143 to allow fixing of the track section 100 to a supporting surface. The base further includes elongate channels 180, 182 for receiving connector lugs as will be described hereinafter.

15

The base 120 and covers 130, 132 are formed from extruded plastic materials, for example PVC or PP (Poly-propylene). The flaps 154 are co-extruded with the covers 130, 132 and are formed from the same material but of lower hardness. The cylindrical conductors 126, 128 are preferably formed from
20 copper with the earth spring 160 being formed from a conductive spring material, preferably an alloy such as beryllium copper or phosphorous bronze.

A second embodiment of track section 100 is shown in Fig. 7. This is generally similar to that described with reference to Figs. 1 – 6 and similar parts have
25 similar reference numerals with the addition of 1000. The essential difference

between this embodiment and that of the previous figures concerns the base member 1180 which instead of being extruded from plastics material is extruded from metal, preferably aluminium. Each conductor 1126, 1128 is disposed in a cavity 1182, 1184 slightly differently shaped compared to the first embodiment

5 via an elongate insulating member 1186, 1188. The insulating members 1186, 1188 are extruded from PVC or PP and are a snap-fit in the cavities 1182, 1184, held in place by co-operating formations ringed at 1190 and 1192. Insulating member 1188 is shown snapped in place in cavity 1184 with member 1186 removed from the cavity 1182. The insulating members 1186, 1188 have

10 opposed jaws which hold the conductors 1126, 1128 in place. In use, the metal extrusion forming the base 1180 and the cavities 1192, 1194 provides an EMI shield between the conductors 1126, 1128 and the data and telecommunications cable runs 1146 and 1148. The EMI shield is further enhanced by the wings 1164, 1166 of the earth spring 1160 which contact the

15 metal base member 1180 at points 1194, 1196 to form a conductive loop around the conductor. The base member 1180 is preferably connected to earth as well as or instead of the earth spring 1160, so that the combination of earth spring and base provides earth protection.

20 A third, preferred embodiment of the track section 100 is shown in Fig. 7a. This is generally similar to the second embodiment and similar parts have similar reference numerals with the addition of a further 1000. The main difference between the second and third embodiments is the structure of the base member 2180 which is also extruded preferably from aluminium. Each conductor

25 2126, 2128 is disposed in a cavity 2182, 2184 slightly differently shaped

compared to the second embodiment via an elongate insulating member 2186,2188 which is also in a different form. The insulating members 2186,2188 are typically made of the same material as the insulating members 1186,1188 of the second embodiment and are a friction-fit in the cavities 2182,2184, held 5 in place by opposing lugs 2200, 2202, 2204,2206 engaging respective co-operating grooves 2208,2210,2212,2214 in the insulating members 2186,2188. Each insulating member 2186,2188 includes an elongate part cylindrical channel 2216,2218 extending along the length direction of the insulating member 2186,2188 so that the conductors 2126, 2128 are a sliding fit therein.

10 The projecting edges 2176,2178 are shaped differently from the previous embodiments and in this embodiment, the edges 2176,2178 curved upwards towards the cover 2130 to engage the arcuate wings 2164,2166 of the earth spring 2160. The T-shaped projection 2152 extending from the base is also differently shaped at the ends. In use, the metal extrusion forming the base 15 2180 and the cavities 2182,2184 provides an EMI shield between the conductors 2126,2128 and the data and telecommunications cable runs 2146,2148 similar to the second embodiment. The enhancement effect is also provided by conductive loops formed by the wings 2164,2166 of the earth spring 2160 and respective contact points 2193,2194,2195,2196.

20 In a further variation, a plastic extrusion provided with a metal conductive film may be used for the second and third embodiments of the apparatus of the invention instead of a metal extrusion. In a further alternative, a plastic extrusion of a first embodiment may be used with a conductive paint or film 25 covering the internal surfaces of the or each cable run 146, 148.

The power point connector 400 shown in Fig. 2 will now be described with more details with reference to Figs. 8, 9a and 9b. The connector includes a cover 410 with openings 412, 414, 416 of a standard UK type three pin plug arrangement, although this, and the supporting mechanism, could be changed to any suitable plug/socket system. The cover 410 and a base 418 together form a housing. The base 418 has a generally circular opening 419 formed therein. A flange member 420 rests in the opening 419 held axially in place against the rim of the opening 419 by snap-fit catch 421 but rotatable relative to the rim. The flange member 420 has itself a circular opening 422 and is provided with radially inwardly extending contact protection members 424, 426 best shown in Fig. 9.

An electrical contact mounting member 430 is snapped on in opening 422. The member 430 has a cylindrical bearing portion 432 connected to a larger cylindrical flange 434. The bearing portion 432 rests in opening 422 with the flange 434 being supported by the edge of the opening. Connected to the bearing portion 432 is a contact arm 441 which is provided with contact holders 436, 438 at each end. The contact arm 441 is further provided with a raised section 435 extending only part of the length of the arm, offset relative to the axis of rotation of the arm. As shown in Fig. 3, in the second embodiment, the cavities 122, 124 are each provided with an inwardly projecting surface 156, 158 of a different length. The surfaces 156, 158 and projection 435 co-operate to allow only rotation of the arm 441 in one direction and not the other to ensure

that a desired polarity of connection between the contact arm 441 and the conductors 126, 128 is maintained.

In the third embodiment of Fig. 7a, the rotation of the arm 441 is limited to one direction by the uniquely shaped projecting edges 2176,2178 which are at different heights relative to the base 2180. The thickness of the contact arm 441 would also be adapted such that one end is thicker than the other (not shown) so that the contact arm 441 can only rotate in one direction and prevented from rotating in another direction by the lower edge 2176.

10

Each electrical contact holder 436, 438 is of a hook form, the tail of the hook being connected to the remainder of the arm 441 and the head being spaced from but resiliently displaceable towards the remainder of the arm. The length of the arm is such that when contact is made with the conductors 126, 128 there is a slide interference fit, so that the contact portions 436, 438 deform to give a pressing electrical contact.

The flange 434 provides a platform for a contact engaging formation 440 which holds live and neutral contacts 442, 444 in place. Each contact 442, 444 includes a pair of opposed arms 446, 448 which are arranged to receive a pin of a mains plug in sliding engagement when inserted through respective openings 414, 416. Arms 446 are connected via a series of angular elements to contacts 450, 452 which engage around the outside of the contacts supporting portions 436, 438 as is best illustrated in Fig. 9b.

25

Earth connection 454 protrudes out of flange 434 and freely makes electrical contact with earth spring 160 once the power point connector 400 is pushed through slot 154. In the embodiment of Fig. 7, the earth spring provides a bridge between the earth connection 454 and the aluminium base member 5 1180 which provides a further earth shield.

A shutter member 460 for closing off socket openings 414, 416 is provided. The shutter member 460 occludes the sockets 414, 416, overlying the arms 446, 448 of the electrical contacts 442, 444. The shutter member 460 has a 10 spindle 462 which is received within a spring 464 which is in turn mounted between four orthogonal posts 466 of the mounting formation 440. The shutter member 460 has slanting engagement surfaces 468, 470 which when a mains plug is inserted through sockets 414, 416 will cause shutter member 470 to rotate and be depressed away from the path of movement of the plug pins 15 allowing the plug pins to engage with arms 446, 448 to make an electrical connection.

When assembled, the arm 441 projects through opening 422 and is rotatable between the position shown in Fig. 9a in which the contacts 450, 452 are 20 covered by protection members 424, 426, and it is in this position that the connector 400 is inserted through slot 152 of track section 100, and the position shown in Fig. 9b after 90 degree clockwise rotation in which the contact member is at right angles to the protection members 424, 426. It is in this position that the contacts 450, 452 engage with the conductors 126, 128, with

the protection members 424, 426 remaining in the slot 110 and locally depressing the earth spring 160.

Operation of the embodiment of the invention will now be described with reference to Figs. 10 and 11 which are part section views, in Fig. 10, of the power point connector 400 when initially inserted into the track section 100 (see Fig. 3) and, in Fig. 11, subsequently rotated clockwise, electrically to engage the conductors of the track section 100. It is to be understood that the location at which the connector 400 engages the track is chosen by the user in accordance with requirements. Once this location is chosen, the connector 400 is placed in a position shown in Fig. 9a with the protection members 424, 426 aligned with slot 110. The connector 400 is then pushed through the cover 154 against the bias of the earth spring 160, pressing this down at the point of entry of the connector 400. The bias of the spring provides a resistance to entry and gives a feeling of positive location of the connectors in the slot to the user.

Since the earth spring 160 is formed from flexible material, the spring resiliently deforms only at the point of entry of the connector 400 and remains in a position to cover slot 110 elsewhere. When fully depressed, the cover 410 is then rotated through 90 degrees. The cover, being connected to the rotatable member 430 also causes the arm 434 to rotate through 90 degrees so that this moves from a position in line with slot 152 to a position in which the arm 434 sweeps into cavities 122, 124 until the contacts 450, 452 engage conductors 126, 128 in sliding engagement to provide an electrical path between the conductors 126, 128 and the arms 446, 448. The direction of rotation is dependent on which way the connector is inserted into the slot, since the offset

projection 435 will strike surface 158 if the connector is turned the wrong way.

Only when turned the right way will the projection 153 not strike the projecting surface 158, thus only allowing connection of the contacts to the correct

conductors. Flange member 420 remains in place during this rotation with

5 contact protection members 424, 426 being held in the channel. The engagement of the arm 446, 448 with conductors 126, 128 and the sides of the adjacent cavities lock the power point connector 400 in place at the chosen location. The connector 400 may then be used by any normal electrical power point.

10

In one variation instead of a power point connector 400 which allows an

electrical device to be connected to the track section 100, the device may be

wired directly to an electrical plug for direct connection to the track section 100

and Fig. 12 shows an exploded view of an embodiment of the plug 750. The

15 plug 750 includes a cover 752 and a ringed base 754 forming a housing. The

cover 752 is attached to the base 754 via screws 756 through threaded holes

758 so that the cover 752 can be separated from the base 754 with ease. A

cable 760 carrying three electrical wires 762,764,766 for "Earth", "Neutral" and

"Live" polarities of a power supply has one end connected to an electrical

20 device and the other end connected to the plug 750. Two elastomeric members

768 are disposed in the plug 750 near the entry of the cable 760 to resiliently

hold the cable 760. The three wires 762,764,766, which are typically insulated,

are stripped to expose a length of copper and attached to respective conductive

25 terminals 770,772,774 using terminal screws 770a,772a,774a. The terminals

770,772,774 are made of metal so that each wire 762,764,766 is electrically

connected to each terminal 770,772,774 and are supported on a circular mounting member 776. The mounting member 776 rests in an opening of the ringed base 754 supported from a lug 778 formed at an edge of the mounting member 776. A fuse 780 is provided to prevent over-supply of current which

5 may damage an electrical device connected to the plug 750. The mounting member 776 also has an insulative partition 782 formed on the base 754 to reduce the possibility of any short-circuit between the terminals 770,772,774 from occurring. Protruding from the other side of the mounting member 776 is a contact arm 784 which instead of a hook shape supporting portion at opposed

10 ends of the contact arm, a resiliently displaceable hemispheric contact or head 900', 902' is used and this is shown more clearly in Fig. 13. The plug 750 also has an engagement surface 920' and as shown in Fig. 15, this and the heads 900,902 protrude out at different points of the contact arm 784. When the plug 750 is inserted through a slot 110 similar to that shown in Fig. 9a, the

15 engagement surface 920' abuts the central portion 162 of the earth spring 160 and resiliently biases the central portion 162 towards the base 2180 (using the embodiment of Fig. 7a as an example). In this way, electrical contact is formed between earth and the earth pin of the plug 750.

20 Concerning Fig. 13, this shows how the cylindrical holders 904', 906' are connected to the terminals 770, 772,774 (with the rest of the components of the plug 750 not shown). Next, how the protruding heads 900', 902' and surface 920' are electrically connected to the respective terminals 770, 772, 774 will be described.

Each holder 904', 906' stands on a support element 930, 932 which is connected via a series of angular elements 934, 936 to respective "neutral" and "live" terminals 770, 774. The structure of the angular elements 934, 936 is shown in a different perspective in Fig. 14, with the holders 904', 906' omitted.

- 5 In this embodiment, the angular element 936 is connected to the "live" terminal 774 via the fuse 780 which provides short-circuit protection. The engagement surface 920' is also provided on a support element 938 and is connected to the earth terminal 772 via an angular element 940 (see Fig. 14). When assembled, the holders 904', 906' are housed in the contact arm 784 with each head 900',
10 902' and the surface 920' protruding out of the contact arm, as described earlier.

Coming back to Fig. 12, the base 754 has a semi-circular channel 786,788 formed on each side of the terminals 770,772,774 for attaching a flange member 790 similar to that used for the power point connector 400 described earlier. The flange member 790 includes snap fit connectors 792 to clip onto the semi-circular channels 786,788 so that the flange member 790 is movable relative to the base 754. The flange member 790 has a circular opening 794 to allow the contact arm 784 to protrude through when the mounting member 776 sits on the ringed base 754. Similar to the connector 400', both ends of the contact arm 784 are covered by inwardly extending protection members 796,798. This arrangement is conceptually similar to that of the connector 400 of Fig. 9a/9b and the contact arm 784 is also rotatable with respect to the protection members 796,798 as shown in Figs. 15 and 16.

Using the first embodiment of the track section, as an example, in use, the plug 750 is inserted into the slot 110 (see Figs. 1 and 3) at a desired point with the contact arm 784 aligned with the protection members 796,798 as shown in Fig. 15. As the plug 750 is inserted into the slot 110, the engagement surface 920' 5 engages the central portion 162 of the earth spring 160 depressing the spring 160 towards the base 120. The limit being reached when the flat portion 162 of the spring 160 touches the projection 152 of the base 120. The plug 750 is then rotated 90 degrees so that the contact arm 784 is at right angles to the protection members 796,798 which are prevented from rotating by the 10 projecting edges 176,178. At the position shown in Fig. 16, the contacts 900', 902' engages the two conductors 126, 128 and an electrical connection is formed between the respective wires 762,766 for providing "live" and "neutral" polarities and the two conductors 126,128.

15 Using the plug 750 as proposed allows a user to connect his electrical device or appliance anywhere along the track section 100 and access electrical power by a simple "insert and twist" action, similar to the power point connector 400.

Fig. 17 shows an end perspective view of a fourth embodiment of the track 20 section of the power supply apparatus. This embodiment is similar to the third embodiment shown in Fig. 7a and similar parts have similar reference numerals with the addition of 2000. The main difference between this embodiment and the third embodiment relates to the structure of the base 4180 (compare this with the base member 2180 of Fig. 7a) which is extruded preferably from plastic 25 material. As shown in Fig. 17 and 18, the base member 4180 is adapted to

accommodate a variation of the conductive member 5100 which in the earlier embodiment of Fig. 7a is in the form of an earth spring 2160.

In the fourth embodiment, instead of a single earth spring spanning the length of
5 the track section 100, the power supply apparatus includes a plurality of separate conductive members 5100 in modular form and arranged inside a cavity 4150 formed between the base member 4180 and covers 4130,4132.

Each conductive member 5100 is supported on respective support modules
10 5200 and collectively arranged on an elongate conductive tray 5300 as shown in Fig. 19. As will be apparent later, unlike the earlier variation, the conductive member 5100 is modular in structure and individually displaceable by a power point connector 400 or an electrical plug 750. Fig. 20 shows the arrangement of Fig. 19 with the different parts exploded in view. Each of these parts will now be
15 elaborated.

Each conductive member 5100, which is electrically connected to earth (via the tray 5300), is formed from flexible, resilient conductive material. Each member 5100 has a flat central portion 5102 with wings 5104,5106 projecting arcuately
20 away from the central portion 5102. At the end of each wing 5104,5106, there is a C-shape rim 5108,5110 which curved inwards for matching a corresponding portion on the support module 5200. The conductive member 5100 also has an elongate slot 5112,5114 formed in each wing 5104,5106 along the wing's length direction. At the central portion 5102, side connecting clips 5116,5118 are
25 provided at the two sides between the two wings 5104,5106 and these clips

5116,5118 are used to releasably connect the conductive member 5100 to the support module 5200.

Figs. 21 to 23 shows close-ups views of a support module with Fig. 22 depicting
5 an end view from the X direction and Figure 23 depicting the other end view from the Y direction of Fig. 21.

The support module 5200 is injection moulded from flexible plastic material to give the module a resilient structure. The module 5200 has a central cavity
10 5201 between a support portion 5202 and a base 5235. The support portion 5202 is adapted to support the conductive member 5100 and includes a rectangular flat section 5203 having a central opening 5204. The support portion 5202 also includes two wing portions 5206,5208 extending from two sides of the flat section 5203 and adapted to correspond respectively to each
15 wing 5104,5106 of the conductive member 5100. Each wing portion 5206,5208 has a C-shaped elongate lip 5238,5240 at the ends to correspond to the similarly shaped rim 5108,5110 of the conductive member 5100. Similar to the wings 5104,5106 of the conductive member 5100, each wing portion 5206,5208 also has an elongate opening 5210,5212, the position of which corresponds to
20 the slots 5112,5114 formed in the wings 5104,5106. At the lower end of each elongate opening 5210,5212 extends a catch 5214,5216 which locates within the slots 5112,5114 of the conductive member 5100. The catch 5214,5216 is angled to releasably connect the conductive member 5100 to the support module 5200.

The support module 5200 also has two side portions 5218,5220 spaced apart and which extends downwards from the flat section 5203. Each side portion 5218,5220 has a rectangular cavity 5222,5224 formed therein to receive the connecting clips 5116,5118 of the conductive member 5100. Each side portion 5 5180,5220 ends with an oval shaped lobe 5226,5228 having a central void 5230,5232. At the perimeter of each lobe 5226,5228 there is a slight arch or depression 5234,5236 and the purpose of this will be apparent later.

10 The base 5235 of the support module 5200 sits on the tray 5200 and has side walls 5231,5233 that meet the c-shaped lips 5238,5240 as shown in Fig. 22. The lips 5238,5240 are so shaped to correspond to the C-shaped rims 5108,5110 of the conductive member when both parts are assembled together.

15 The support portion 5202 of the module 5200 comprising the wing portions 5206,5208 and the flat section 5203 are resiliently displaceable or movable with respect to the base 5235. When a force is applied on the flat section 5203 towards the base 5235, the wing portions 5206,5208 spread the side walls 5231,5233 so that the section 5203 can be resiliently biased in response to the applied force. As shown in Figs. 22 and 23, the module 5200 has two 20 rectangular shoulders 5242,5244 located in the cavity 5201 and which extend from the side walls of the base 5235 and the shoulders 5242,5244 are arranged to locate through the openings 5210,5212 when the top section 5202 is displaced towards the base 5235. The shoulders 5242,5244 is used to abut against a connector which is used to displace the support portion 5202 towards 25 the base. The shoulders 5242,5244 thus act as stoppers to alleviate the force

asserted on the flat section 5203. When located in respective openings 5210,5212, the shoulders 5242,5244 also alleviate lateral movement between the support portion 5202 and the base 5235 due to the force on the top section 5203.

5

The module 5200 also includes two guiding elements 5246,5248 in the cavity 5201 and which is connected to the base 5235. The guiding elements 5246,5248 are spaced apart and arranged side by side to locate in the space between the two lobes 5226,5228 when the flat section 5203 is biased towards the base 5235. Two arch shaped protrusions 5250,5252 extend in opposing directions from the guiding elements 5246,5248 and the height of the protrusions 5250,5252 is adapted to abut against respective arches 5234,5236 of the resilient lobes 5226,5228 to restrain the top section 5202 from being forced towards the base so as to alleviate damage to the module 5200. The resilient lobes 5226,5228 also help to bias the section 5203 away from the base 5235 when the force on the section 5203 is removed. The lobes 5226,5228 thus provide a "spring" effect within another "spring" effect which is provided by the entire resilient structure of the support member 5200.

10 Formed in the base 5235 between the two guiding elements 5246,5248 is an elongate hole 5253 as shown in Fig. 24, which is a bottom view of the module 5200 of Fig. 21, and the hole 5253 is used for arranging the module 5200 on the tray 5300.

15

To align the module 5200 with a like module, the module 5200 has two angled lugs 5254,5256 extending from two corners of the module 5200 near the base 5235. On opposing corners of the module 5200 near the base 5235 are corresponding lug slots 5258,5260 adapted for receiving the angled lugs 5254,5256 of another module 5200. The arrangement of the lugs 5254,5256 and the slots 5258,5260 are illustrated in Fig. 24. To align two modules 5200 together, the angled lugs 5254,5256 of the second module are disposed in the lug slots 5258,5260 of the first module.

10 Concerning the tray 5300, this is illustrated as a perspective view in Fig. 25 and as an end view in Fig. 25. The tray 5300 is formed from conductive material and is used to receive the module 5200. The tray 5300 has a plurality of spaced strips 5302 arched inwards of the tray 5300 which are cut and stamped into the curved shaped. The side walls 5304,5306 of the tray are shaped to match the 15 side walls 5231,5233 of the modules 5200 and at the ends of the side walls of the tray 5300 are C-shaped rims 5308,5310 for engaging the curved lips 5238,5240 of the module (and the conductive member when all these are arranged together). The spacing between the strips 5302 is arranged so that a strip 5302 can be located within the elongate hole 5253 of a module 5200.

20 To assemble these parts together, a conductive member 5100 is first placed on a support module 5200 by aligning the C-shaped rims 5108,5110 on respective curved portions 5238,5240 of the module, the central portion 5102 on the flat section 5203, and hooking the catch 5214,5216 to the elongate slots 25 5112,5114. The side clips 5116,5118 are also clipped to the rectangular cavities

5222,5224 of the module 5200. Each of the conductive member 5100 is individually arranged on the modules 5200 and the modules 5200 are then aligned together by sliding the lugs 5254,5256 into corresponding slots 5258,5260 of a like module. Eventually, a train of modules 5200 and respective 5 conductive members 5100 is formed. When this is done, the train is arranged in the tray 5300 with an arched strip 5302 located within a corresponding elongate hole 5253 of a module 5200. The side walls of the tray 5300 is biased open as the modules 5200 are inserted into the tray so that the c-shaped rims 5308,5310 engage the c-shaped rims 5108,5110 of the conductive member 10 5100 and the module's curved portion 5238,5240. Since the tray 5300 is made of conductive material, each conductive element 5200 is electrically connected to the tray via the c-shaped rims 5308,5310. If the tray 5300 is electrically connected to earth, each conductive member 5100 is also thus connected. When the components are assembled in the tray 5300, the conductive 15 members 5100 and respective support members 5200 are depressed using a tool so that the assembled components can be inserted into the track section.

When the conductive members 5100 are arranged on the support modules 5200, each of these conductive members 5100 is individually displaceable by a 20 connector 400 or plug 750 and Fig. 27 showing four conductive members 5100 and corresponding support modules 5200 being displaced by a connector 400 or plug 750. Fig. 28 shows a side view of the tray of Figure 27 to show the displacements of the four conductive elements 5100 and support modules 5200.

Next, the use of the plug 750 of Fig. 15 to displace the support members 5100 will be described. As explained earlier, the plug 750 in the arrangement shown in Fig. 15 is connected to a track section 100 by inserting the contact arm 784 and protection members 796,798 through the slot 4154 (using the embodiment 5 of Fig. 18 as an example). The elongate arrangement of the contact arm 784 and protection members 796,798 abut four of the conductive members 5100' and respective support modules 5200' (the ' here denotes those conductive members and support modules being displaced by the plug 750) with the engagement surface 920' making contact with one of the conductive members 10 5100. To secure the plug 750 to the track section 100, the plug 750 is rotated 90° as shown in Fig. 29. The end protection members 796,798 continues to depress two of the displaced conductive members 5100' and the rotated contact arm 784 depresses the centre two conductive members 5100'. The hemispheric contact heads 900', 902' thus make electrical contact with respective "live" and 15 "neutral" conductor 4126,4128. The earth connection is formed with the engagement surface 920' being in contact with one of the conductive members 5100.

To show the arrangement of Fig. Fig. 29 in more detail, a simplified view is 20 shown in Fig. 30 with some of the components of the track section 100 removed. Figure 31 further illustrates the arrangement of Fig. 30 in a perspective view to more clearly show how the contact arm 784 and protection members 796,798 displaces four of the conductive members 5100 with the plug 750 in an engaged position. Note that the first module 5200 (the module with

the lugs 5254,5256 being depicted in Fig. 31) is not displaced and Fig. 29 thus shows the conductive element 5100 in an uncollapsed state.

With the conductive members 5100 in modular form, it is easier to replace and
5 service any of the members 5100 and corresponding modules 5200. Since each
of the conductive members 5100 is separately supported, each of them can be
individually displaced by a plug 750. This helps to create a "zero" gap between
the plug and the conductive members 5100 that are not displaced as shown in
Figure 31. This improves a safety aspect of the track section.

10

The described embodiments should not be construed as limitative. In the support module 5200, lugs 5254,5256 are used to align like support modules together but connection means can be used as long as the connection means is near the base 5235 and which does not interfere with the biasing of the support
15 portion 5202.

In Fig. 31, the plug 750 is depicted as displacing four of the conductive members 5100 and support modules 5200. It should be apparent that this is not necessary the case and depending on design, the plug 750 and/or conductive
20 members 5100 and/or support modules 5200 can be adapted so that more or less conductive members 5100 are displaceable by the plug 750.

The support member 5200 may be in other suitable forms such as a resilient spring coil supporting a steel cap (conductive member 5100). In addition, the

conductive members 5100 with the support members 5200 may be used as "shutters" which occludes the slot 4154 without a need for protective flaps.

Although it is preferred to have the conductive member 5100 resiliently supported by a support member 5200, this is not absolutely necessary since the earth spring 160 of Fig. 5 can be modularised such that the earth spring 160 is divided into individual conductive members with each member separately supported by a part of the conduit similar to that illustrated in Fig. 7a.

10 The described embodiments of the track section may be particularly used as a fixed power distribution apparatus, with the combination of track sections and connectors as shown in Figure 1 being connected to a suitable supporting surface, such as a wall or movable partition or furniture item. However, the described embodiments may also be used in a movable manner, for example 15 as an extension cable, with a single track section being provided with two end connectors, one end connector being connected to a cable having a suitable plug at its free end, in the manner of a normal extension cable. One or more power point connectors may then be attached to the track section according to need.

20 Referenced is made to co-pending PCT application no. PCT/SG03/00100, the contents of which is incorporated herein by reference.

CLAIMS

1. Electrical power supply distribution apparatus comprising:
 - a conduit including at least one elongate conductor, the conduit having an opening through which a connector is able to be inserted to connect electrically with the conductor;
 - a plurality of conductive members disposed between the opening and the conductor, each conductive member being separately supported and resiliently displaceable by a said connector to provide access to the conductor.
2. Electrical power distribution apparatus according to claim 1, further comprising a plurality of resilient support members.
- 15 3. Electrical power distribution apparatus according to claim 2, wherein each conductive member is resiliently supported by a respective support member.
4. Electrical power distribution apparatus according to claim 2 or 3, wherein each support member resiliently biases the conductive members towards the opening.
- 20 5. Apparatus as claimed in any one of claims 2 to 4, wherein each conductive member has a sheet-like surface and a side portion engaging the support member.

6. Apparatus as claimed in claim 5, further comprising two opposed side portions.
7. Apparatus as claimed in claim 5 or 6, wherein the or each portion is of winged form.
8. Apparatus according to claim 7, wherein each support member has side sections corresponding to the winged portions of the conductive member.
- 10 9. Apparatus according to any one of the preceding claims, wherein each support member further comprises a support portion for supporting a said conductive member and a base connected to the support portion, whereby the support portion is resiliently displaceable towards the base.
- 15 10. Apparatus according to claim 9, wherein the support member has a resilient portion extending towards the base.
11. Apparatus according to claim 10, wherein the support member comprises a further resilient portion extending towards the base.
- 20 12. Apparatus according to claim 10 or 11, wherein the or each resilient portion has a central void.
13. Apparatus according to claim any one of claims 10 to 12, wherein the or each resilient portion has a depression facing the base.

14. Apparatus according to claim 13, wherein the base has an abutment surface arranged to engage the depression.
- 5 15. Apparatus according to any one of claims 10 to 14, wherein the resilient portion is oval-shaped.
16. Apparatus according to any one of claims 2 to 15, wherein the support member is formed from plastic material.
- 10 17. Apparatus according to any one of claims 2 to 16, wherein the support member comprises means to align the support member with a like support member.
- 15 18. Apparatus according to claim 17, wherein the alignment means is in the form of a lug and a corresponding slot for receiving a said lug of a like support member.
19. Apparatus according to any one of claims 2 to 18, wherein the support member includes means for connecting to the conductive member.
- 20 20. Apparatus according to claim 19, wherein the connection means is in the form of a catch.

21. Apparatus according to any one of claims 2 to 20, wherein the conductive member includes means for connecting to the support member.
- 5 22. Apparatus according to claim 21, wherein the connection means is in the form of a clip.
23. Apparatus according to any one of claims 2 to 22, further comprising an elongate tray for receiving the plurality of support members.
- 10 24. Apparatus according to claim 23, wherein the tray is formed from conductive material.
- 15 25. Apparatus according to claim 24, wherein the tray is electrically connectable to each conductive element.
26. Apparatus according to any one of claims 23 to 25, wherein the tray comprises a plurality of spaced arched strips, each strip being arranged to locate within a slot of a said support member.
- 20 27. Electrical power distribution apparatus according to any one of the preceding claims, wherein the conductive member occludes the opening.
28. Electrical power distribution apparatus according to any one of the preceding claims, wherein the conductive member seals the opening.

29. Electrical power distribution apparatus according to any one of the preceding claims wherein the conductive members forms an earth connector.

5

30. Apparatus according to any one of the preceding claims, wherein the plurality of conductive elements are spaced apart from each other.

10 31. A support member for use in the electrical power supply distribution apparatus according to any one of claims 2 to 30.

15



G00002

ABSTRACT**ELECTRICAL POWER DISTRIBUTION APPARATUS**

5

In one embodiment, an improved electrical power distribution apparatus is disclosed which includes a conduit 100 containing at least one elongate conductor 4126,4128. The conduit 100 has an opening 4154 through which a connector is able to be inserted to connect electrically with the conductor 4126,4128. The improvement relates to the use of a plurality of conductive members 5100 disposed between the opening 4154 and the conductor 4126,4128, and a plurality of resilient support members 5200 such that each conductive member 5100 is separately supported by a respective support member 5200 and displaceable by a connector to provide access to the conductor.

15

FIG. 17

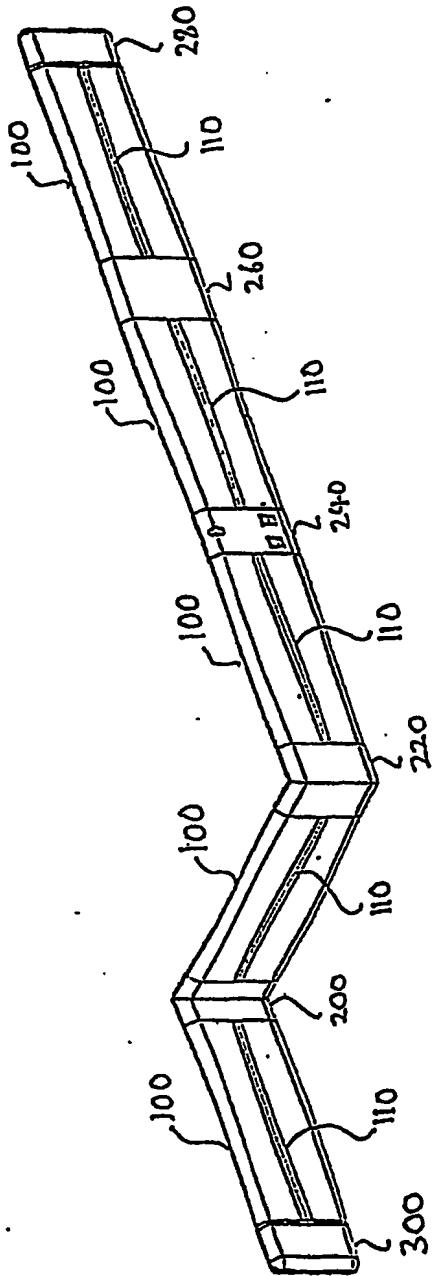
163163



1/32



•G00002•



۱

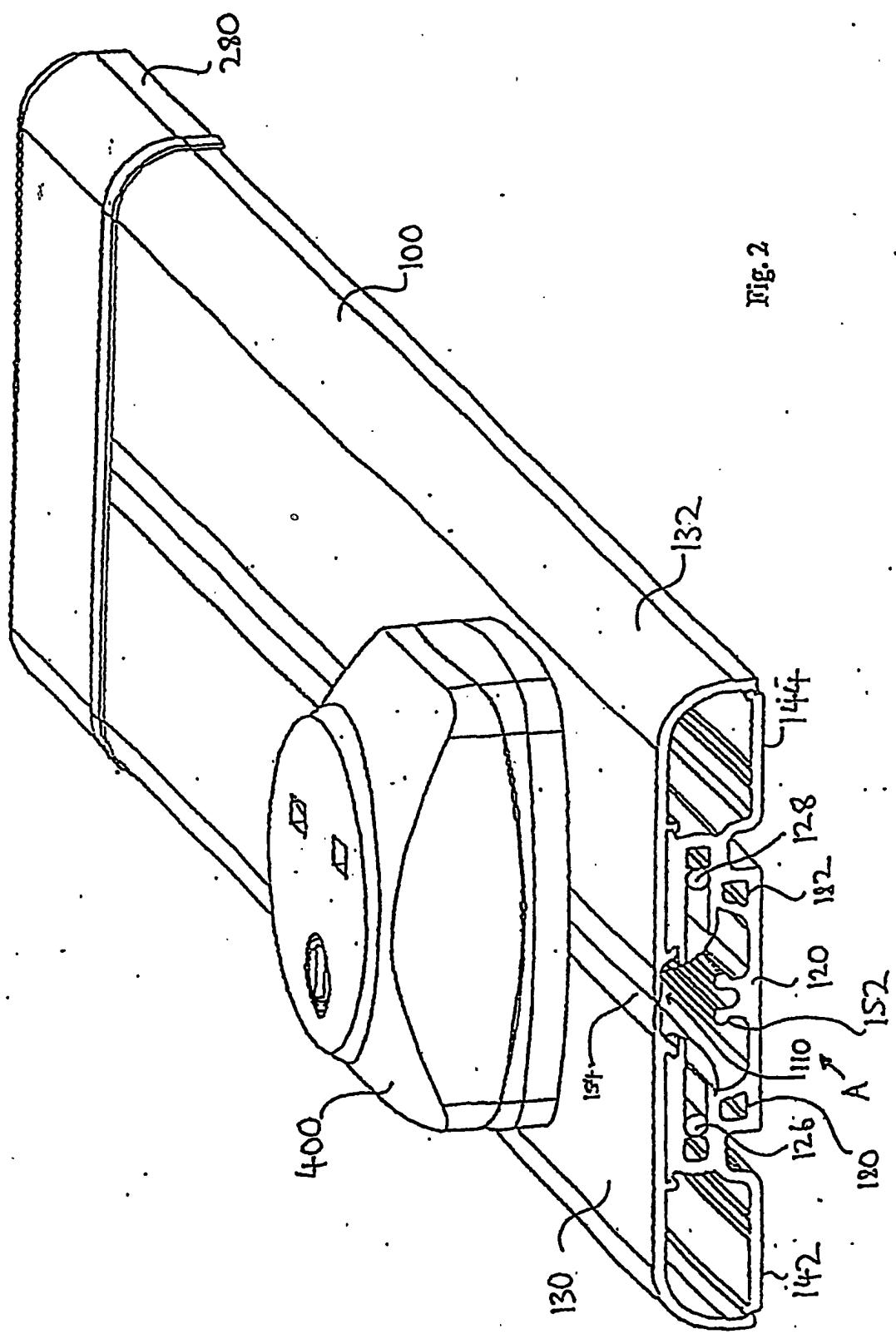


Fig. 2

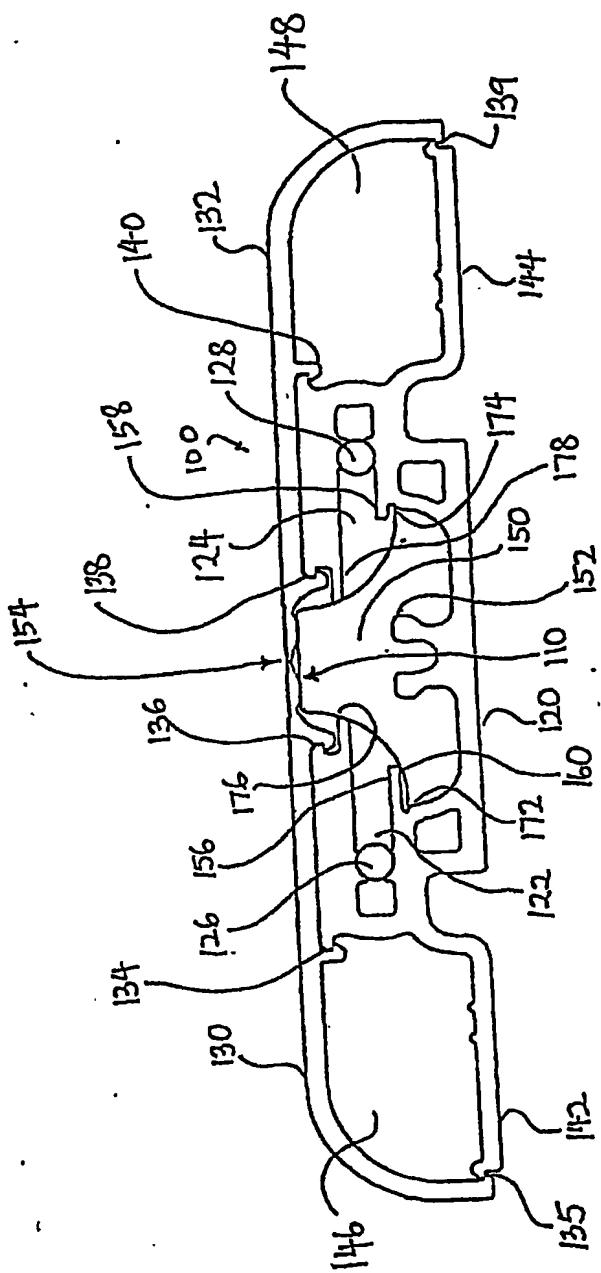


FIG. 3

4/32

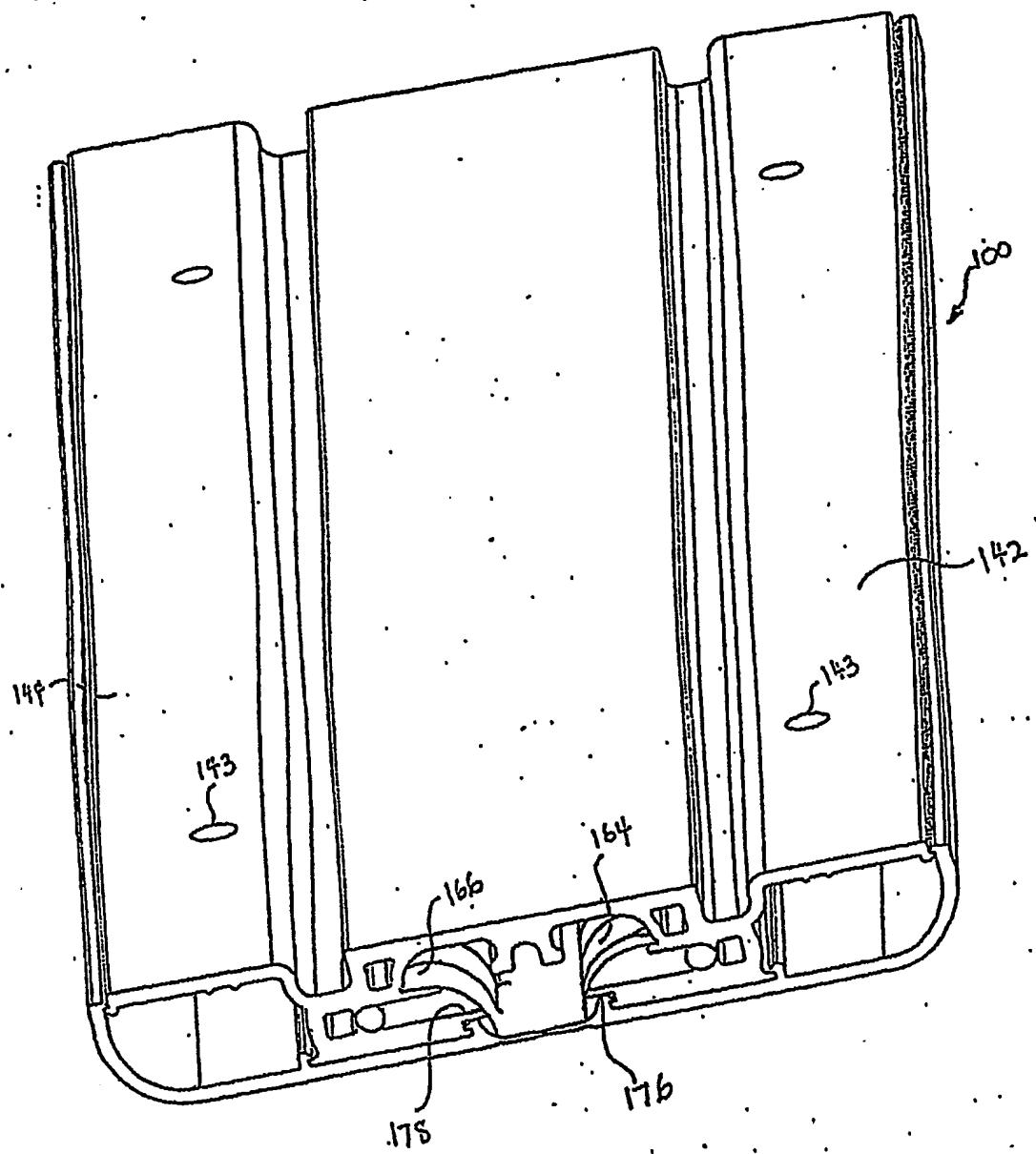


FIG. 4

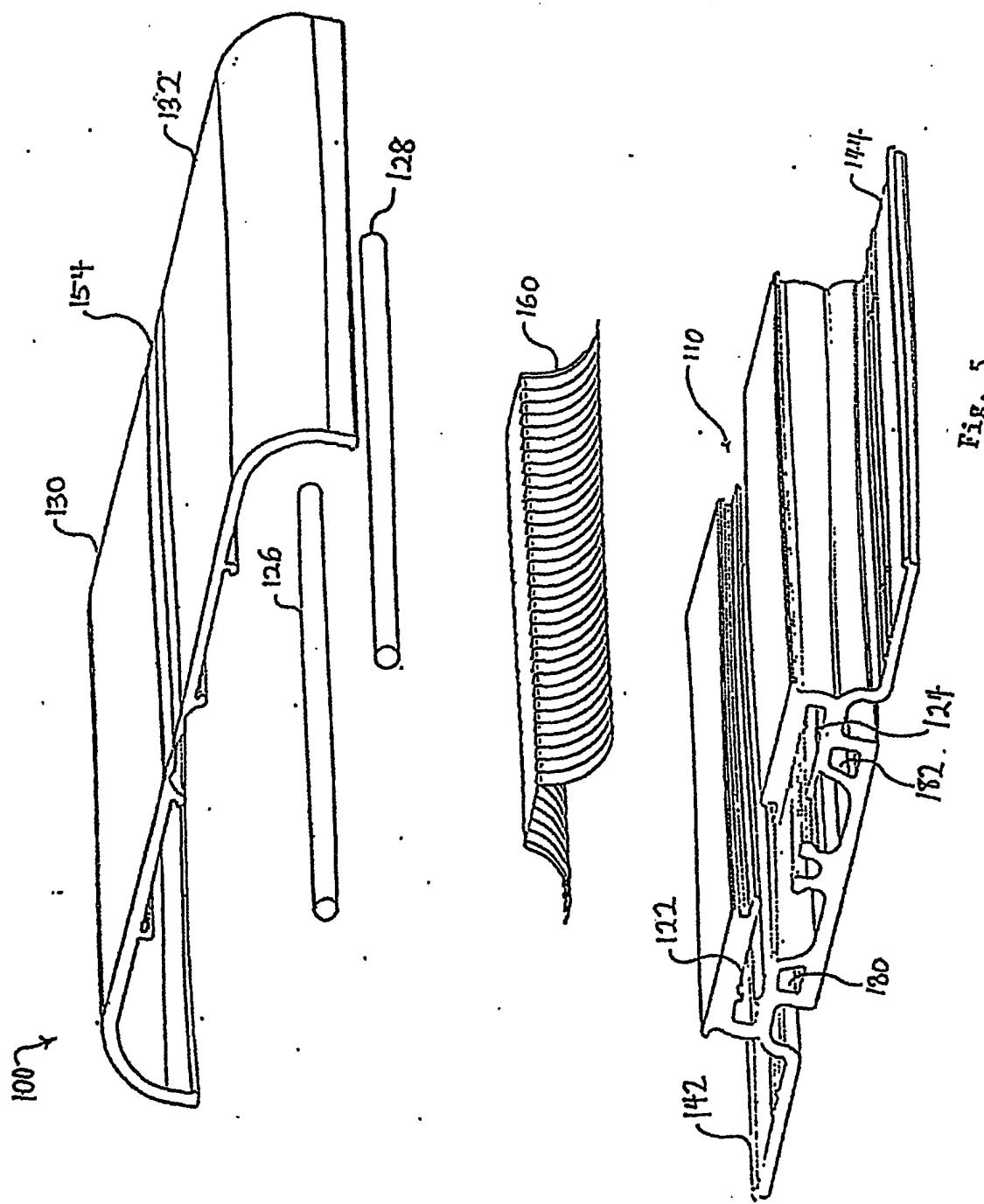


Fig. 5

6/32

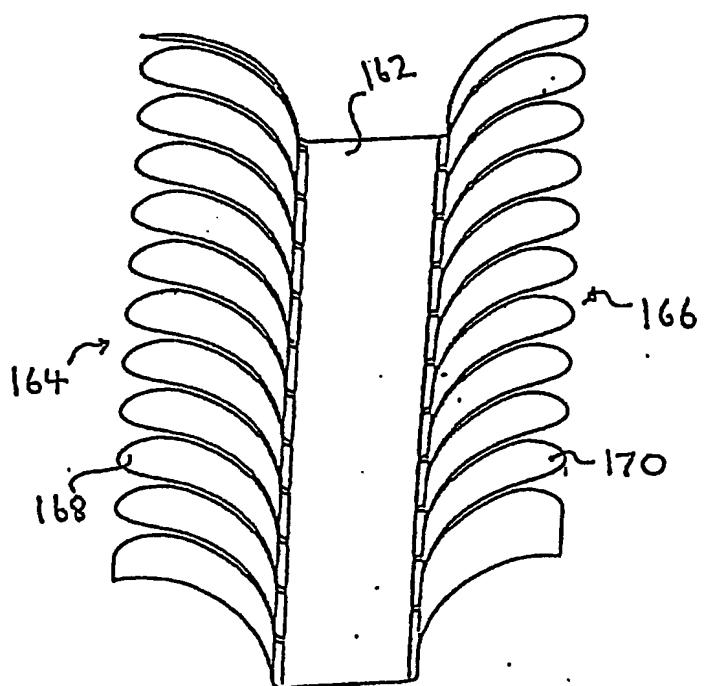


Fig. 6

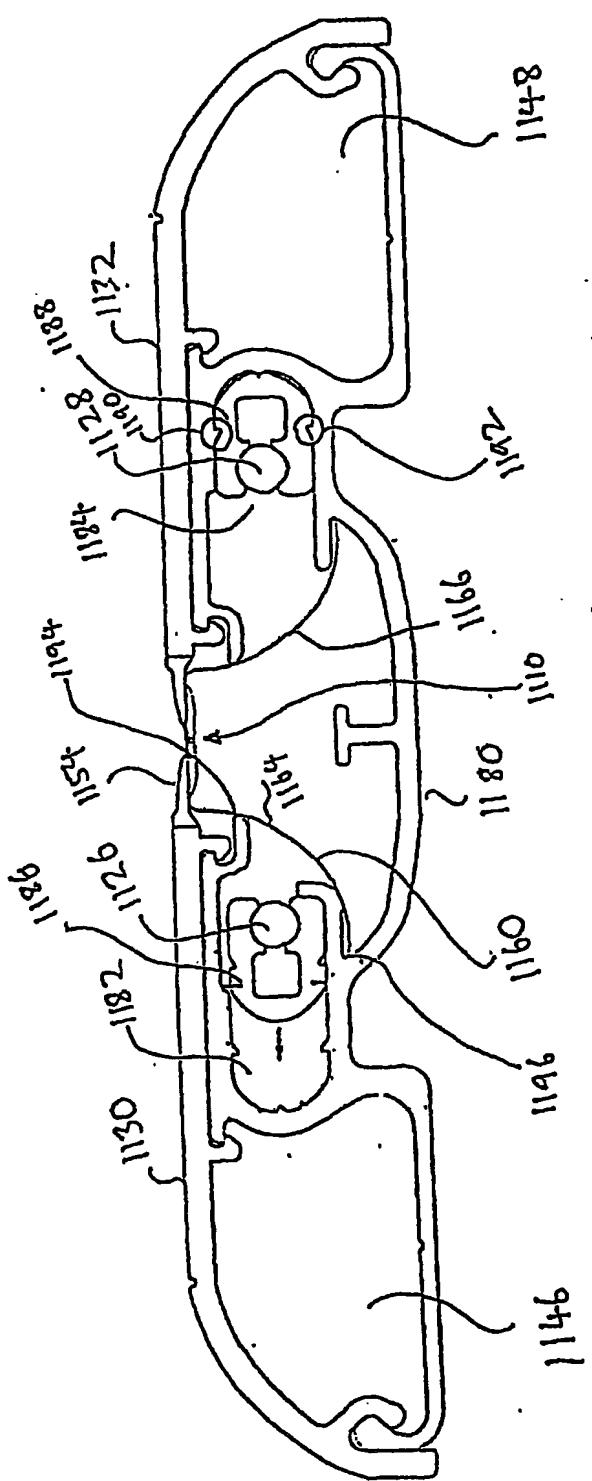


Fig. 7

8/32

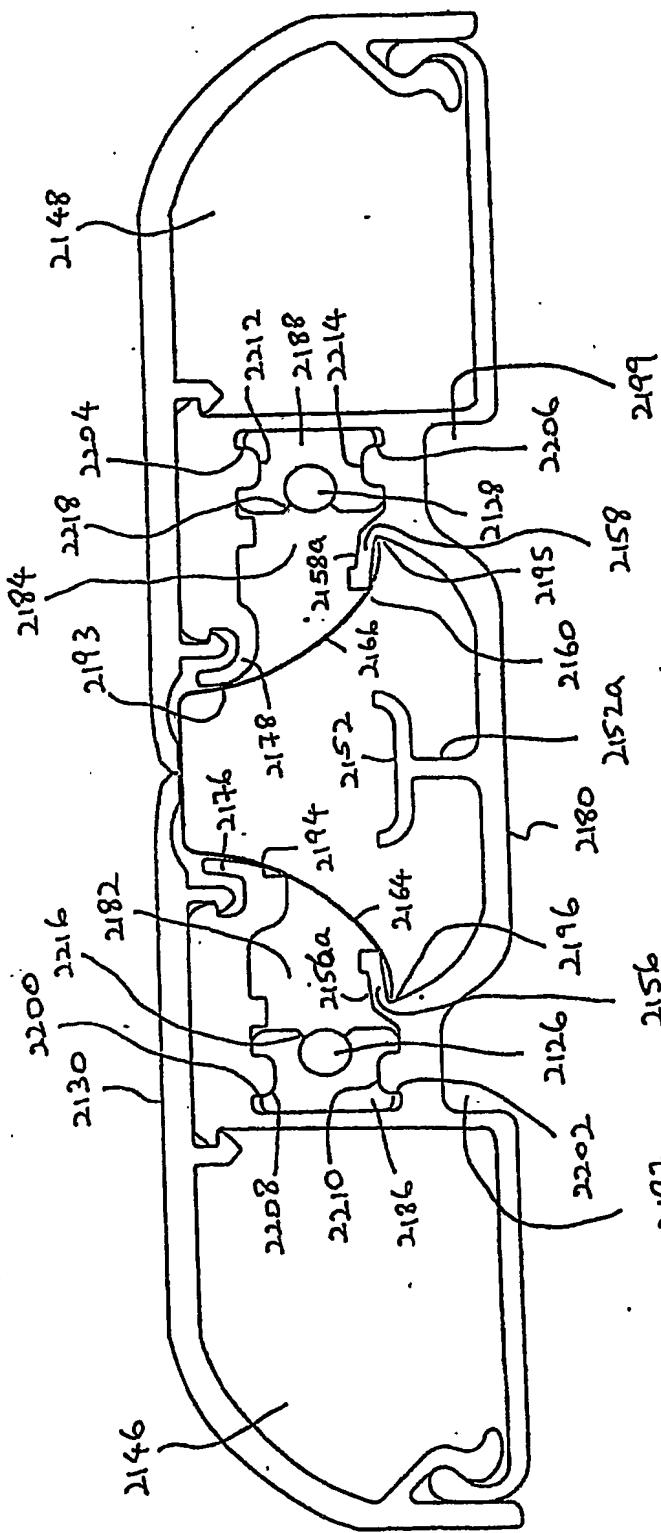


Fig. 7a

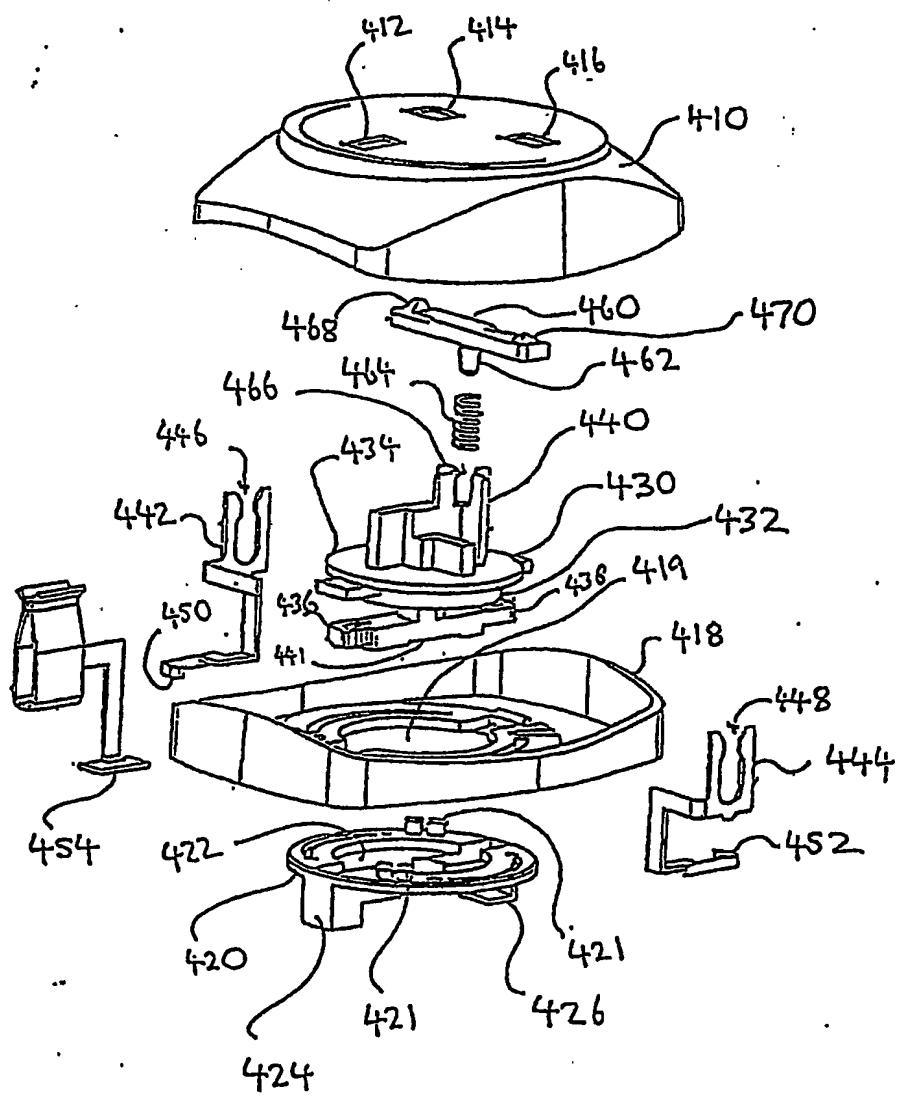


Fig. 8

10/32

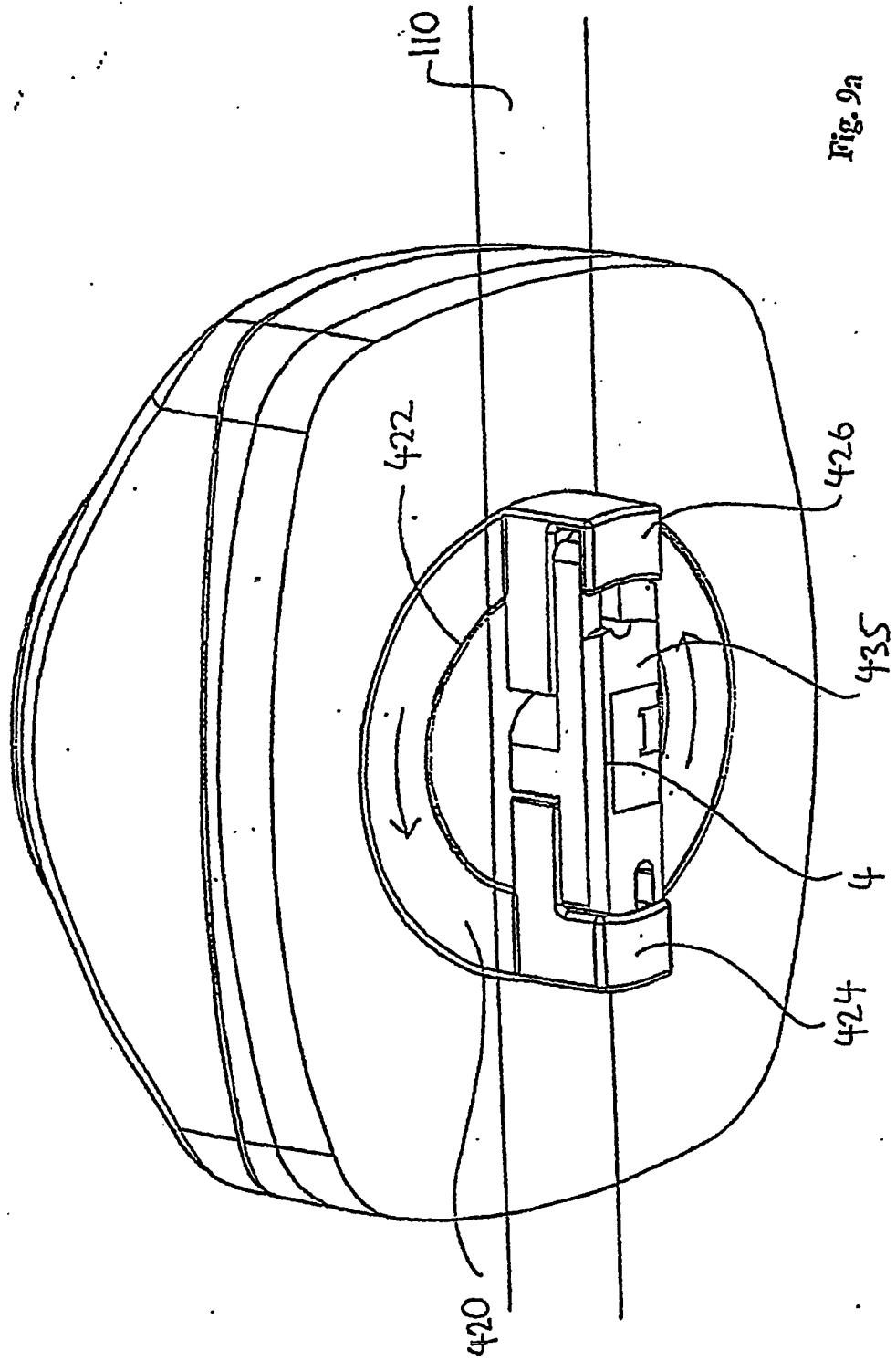


Fig. 9a

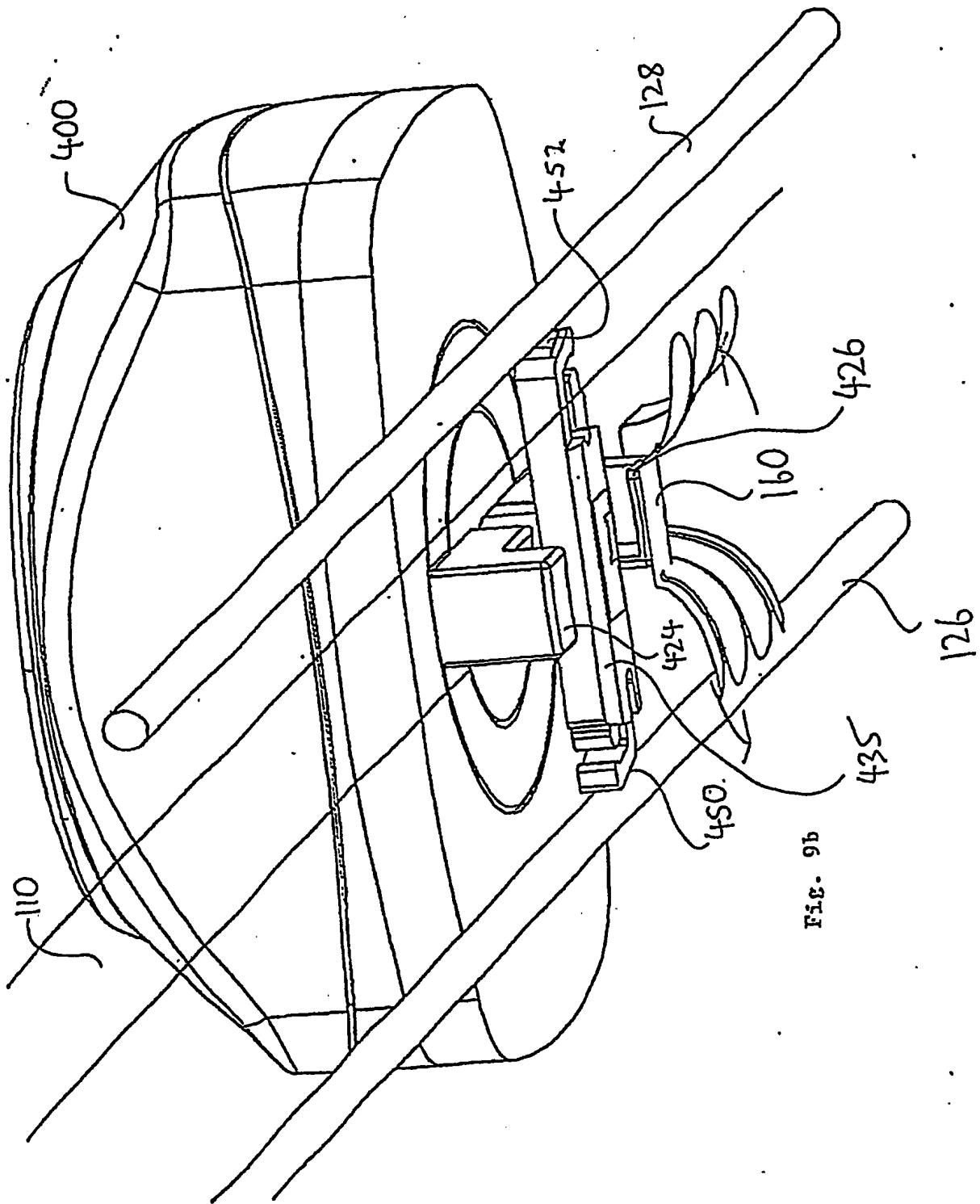


Fig. 9b

Fig. 10

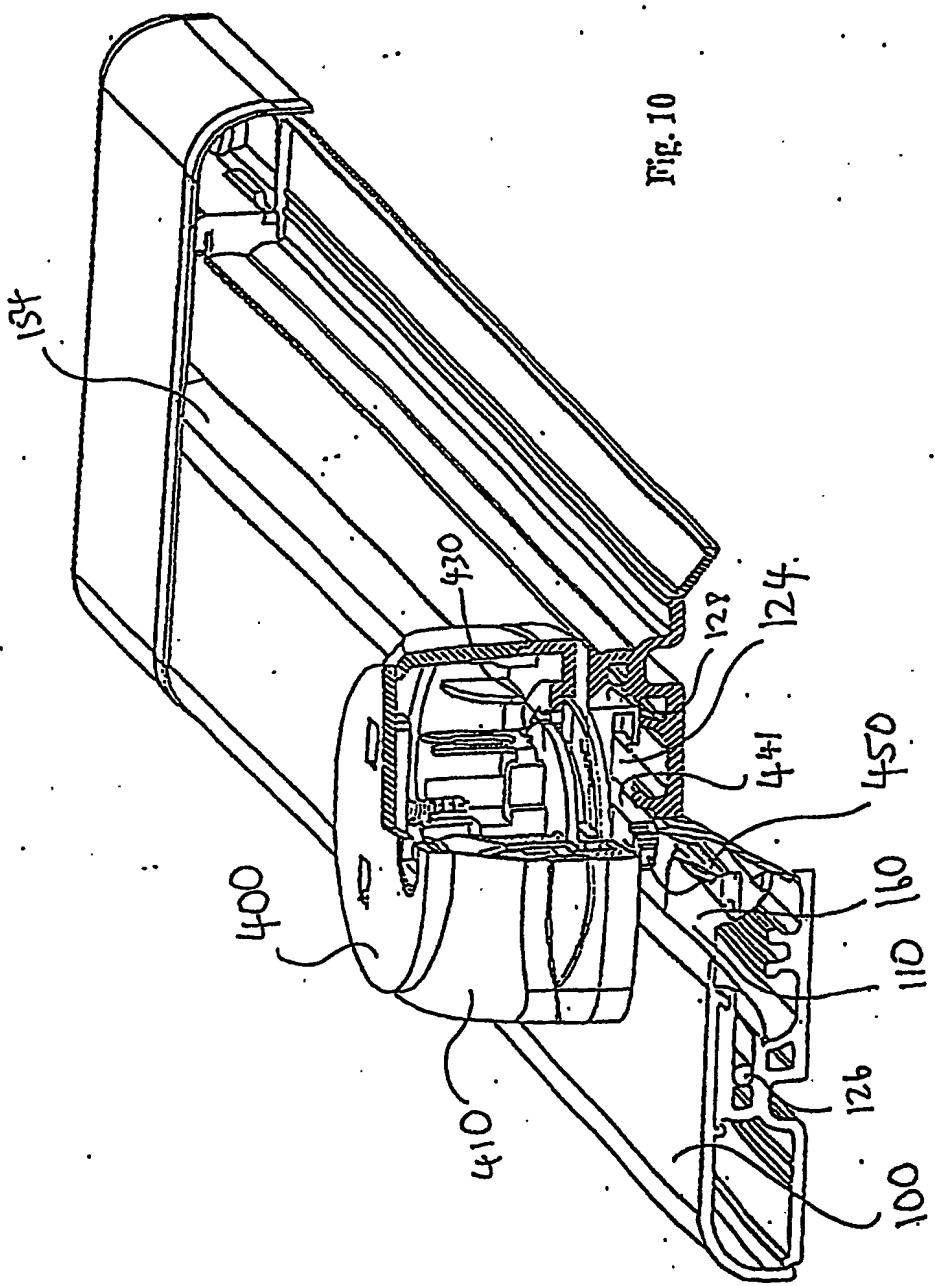
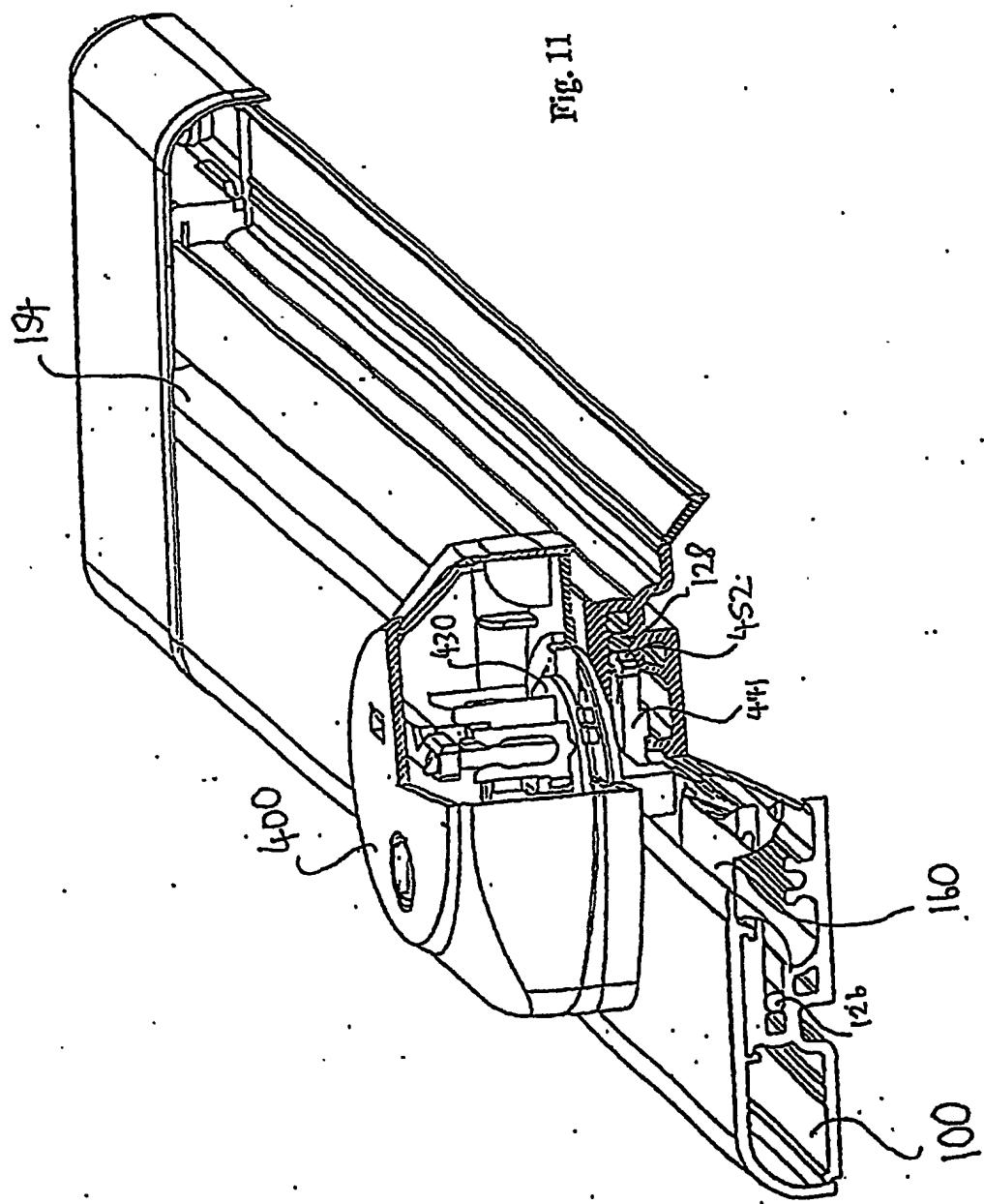


Fig. 11



14/32

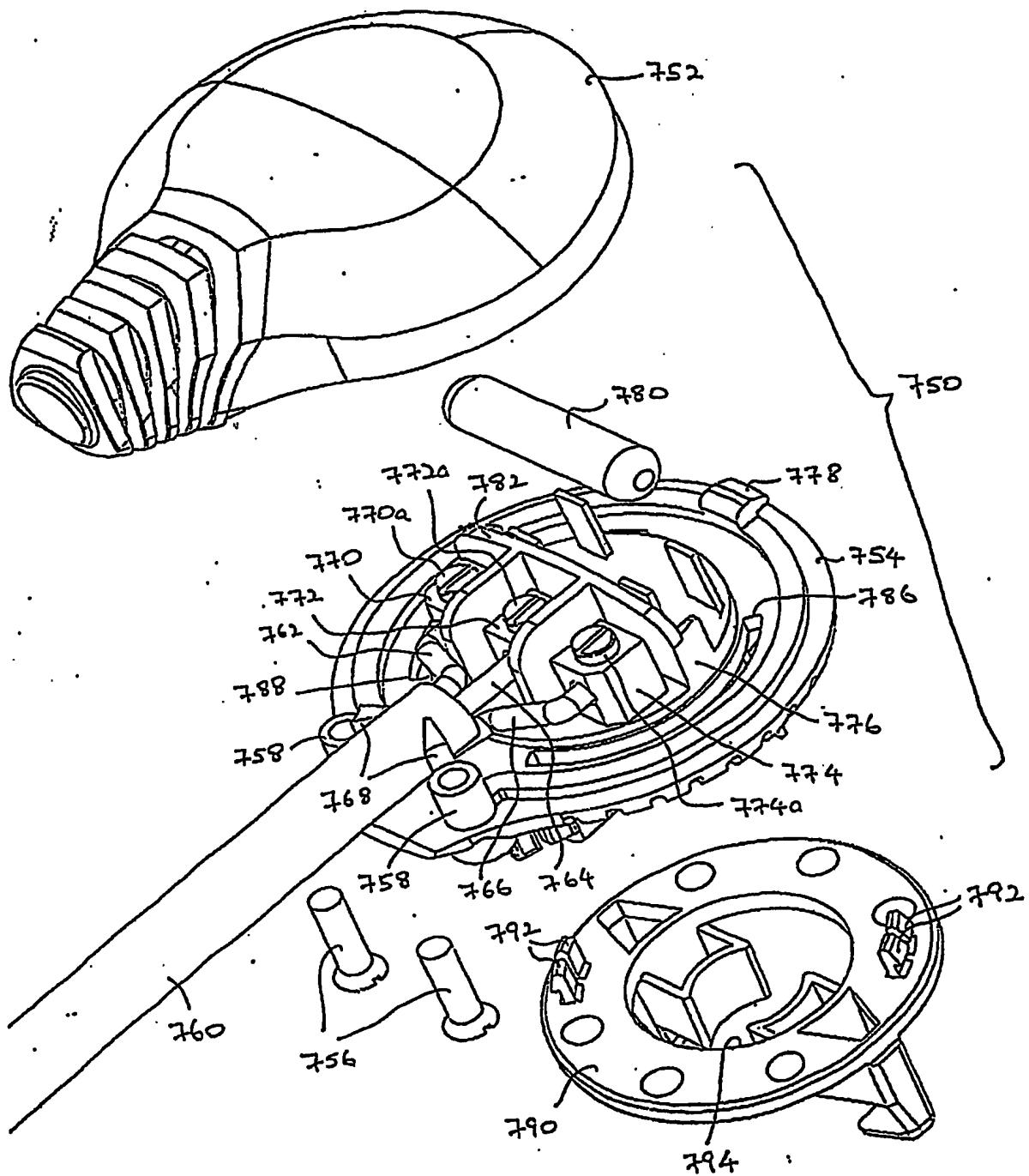


Fig. 12

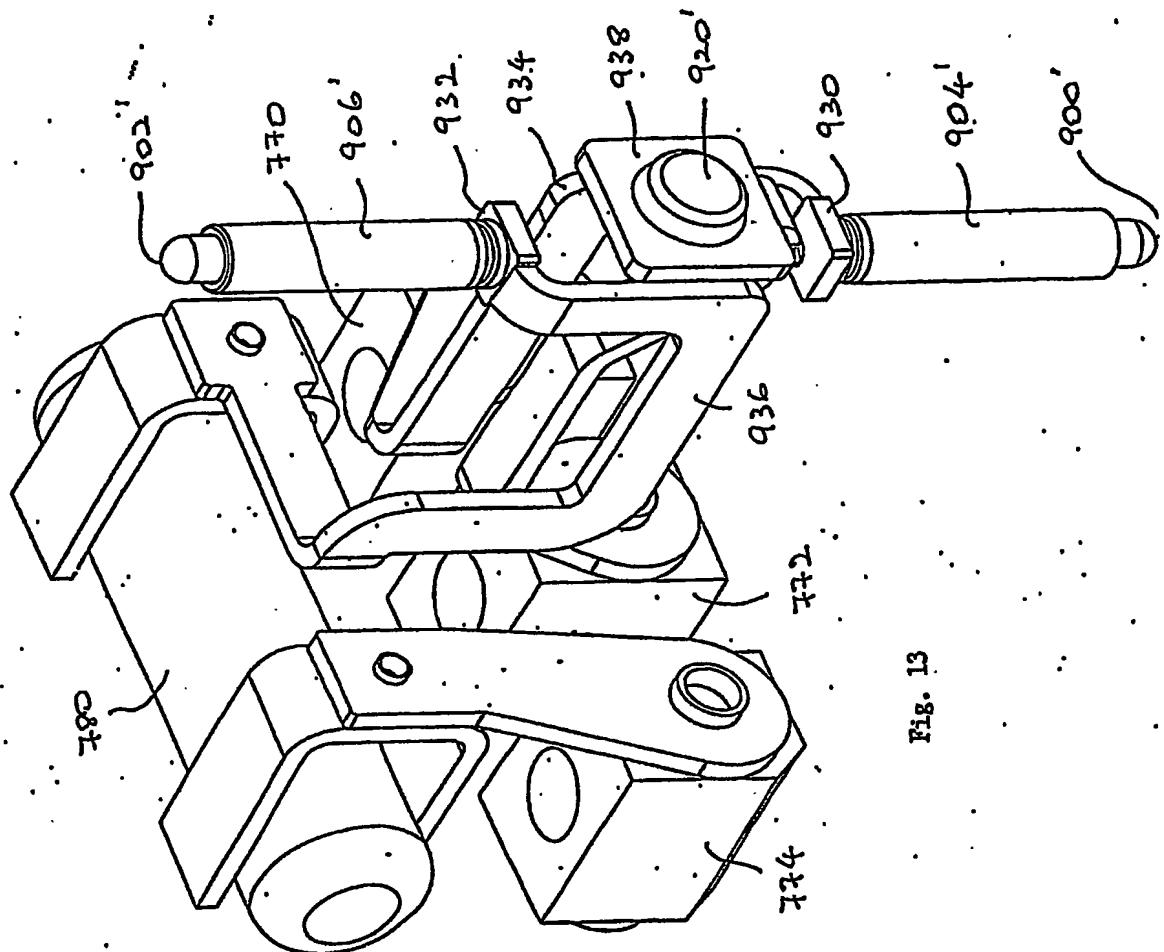
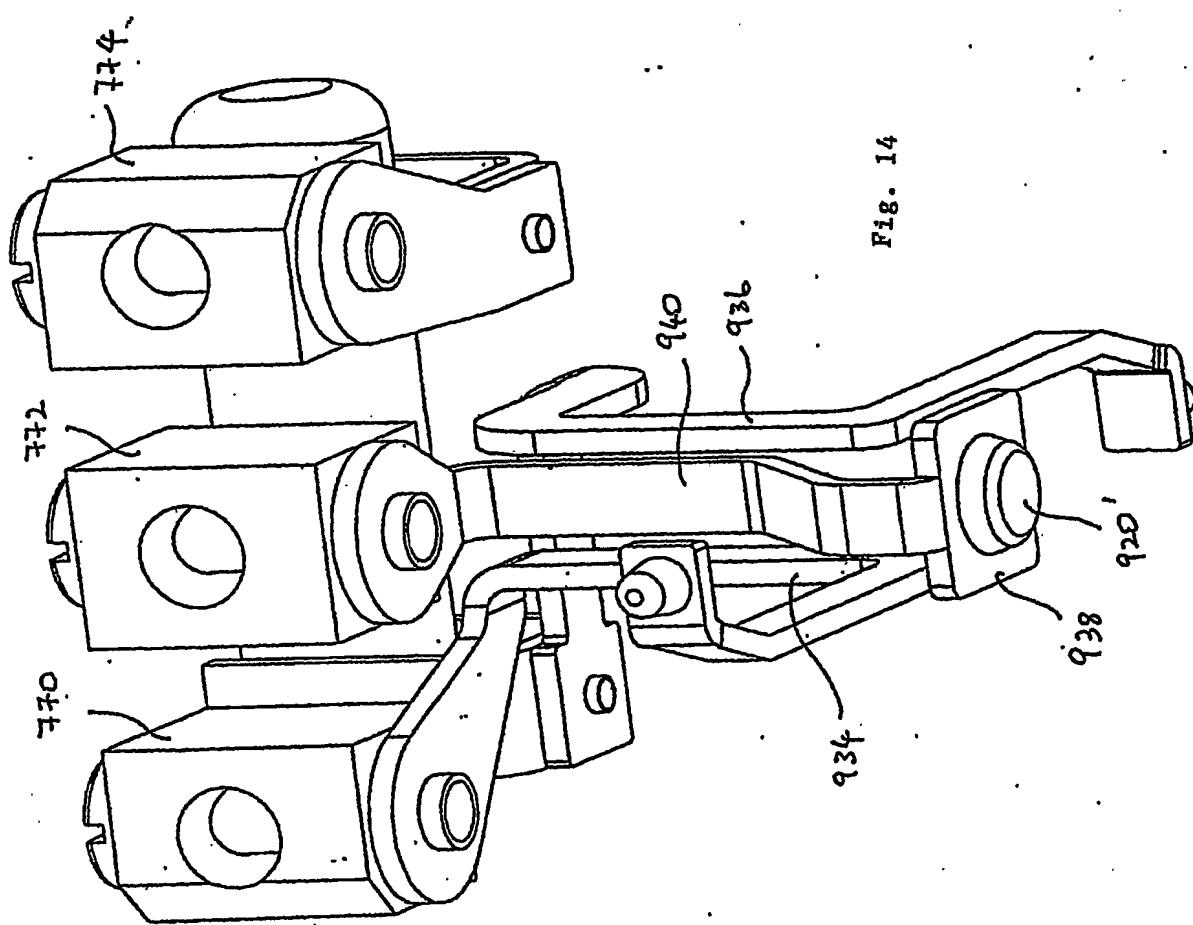
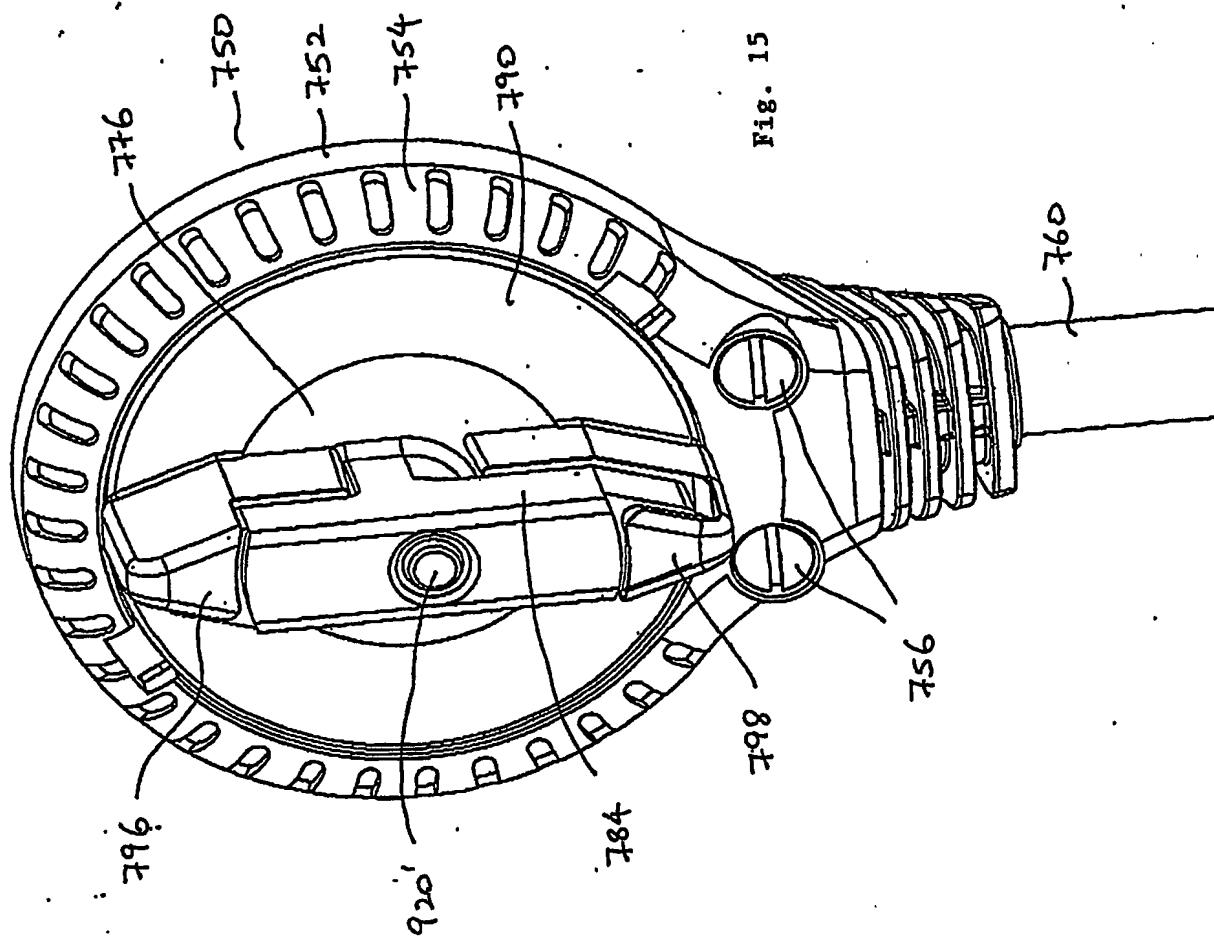
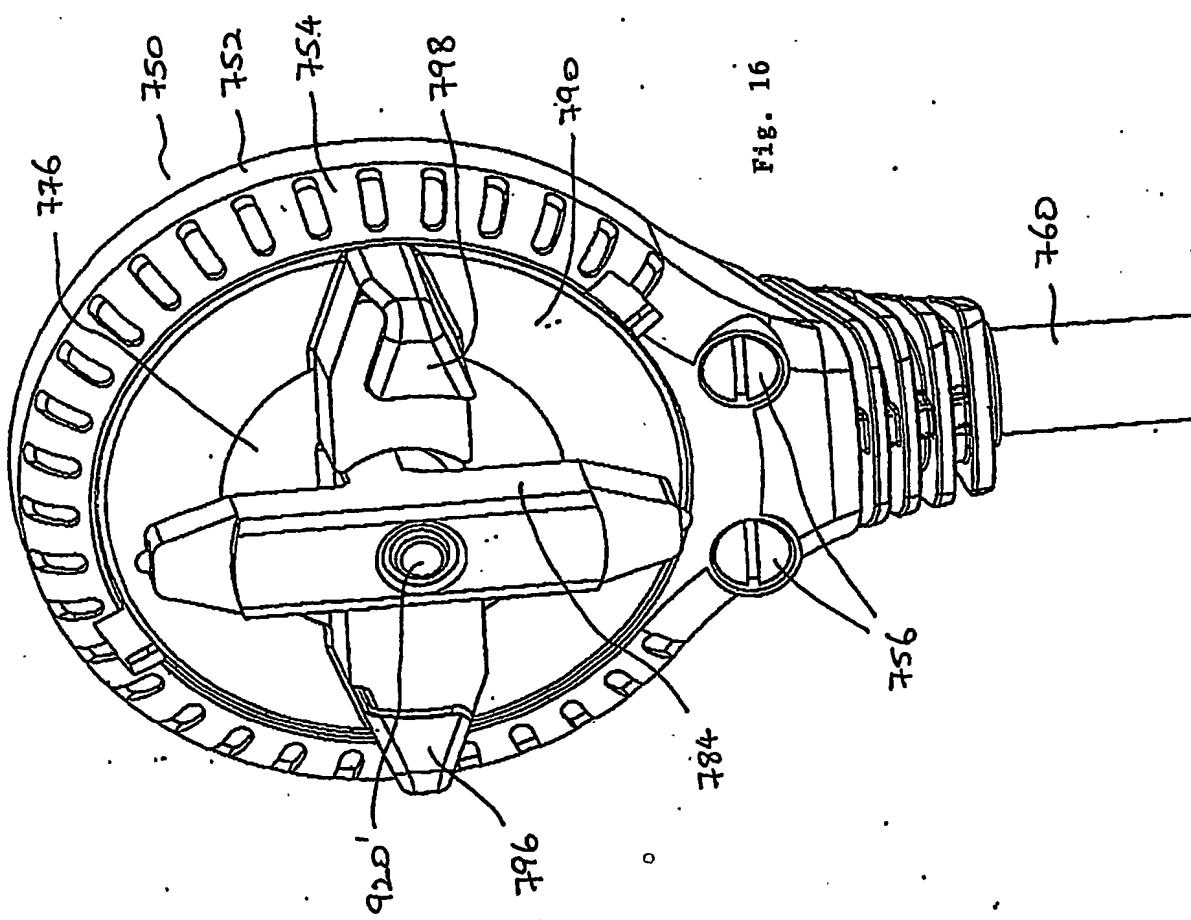


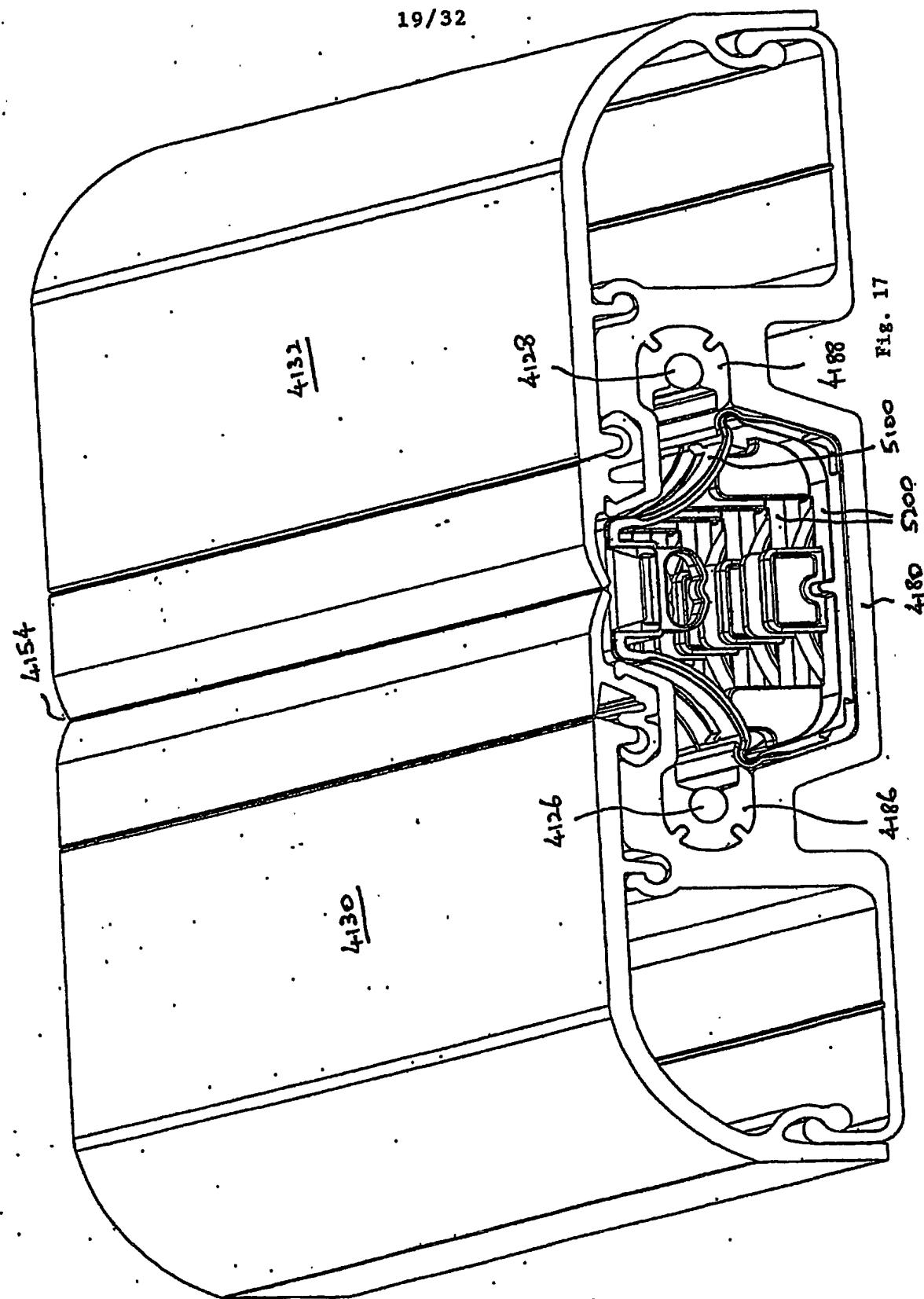
Fig. 13







19/32



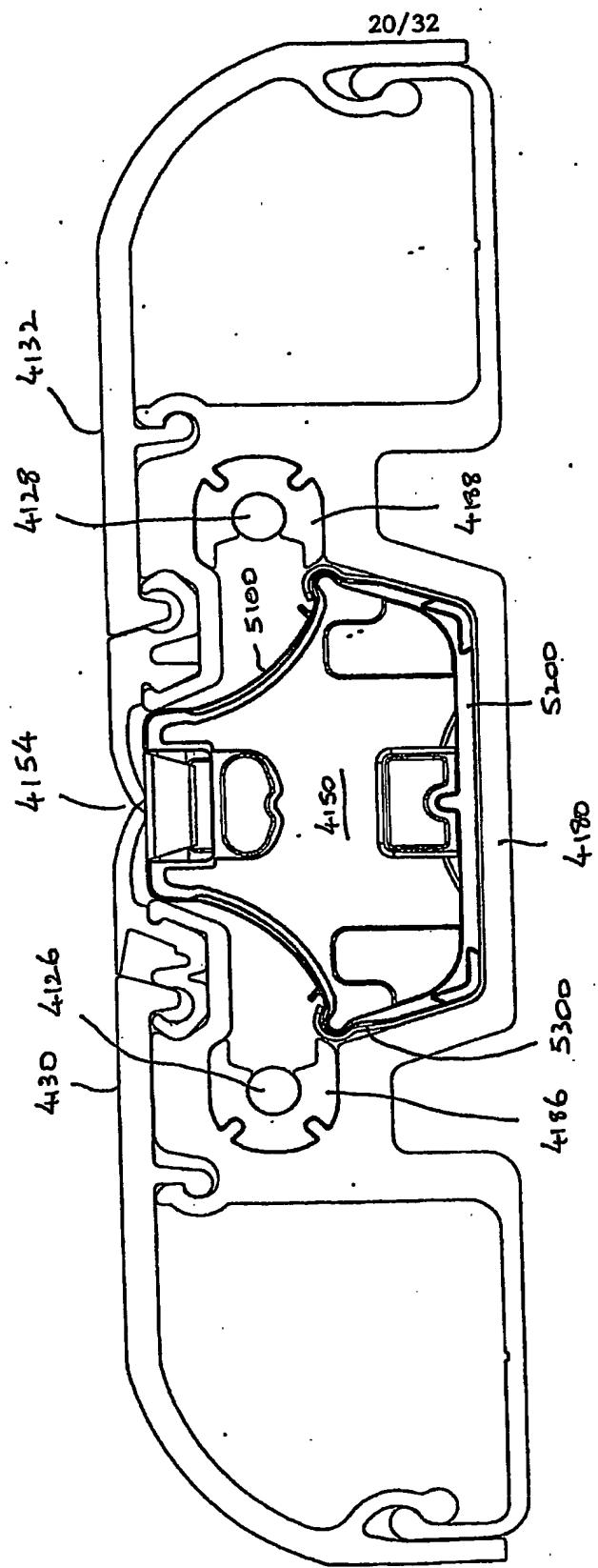
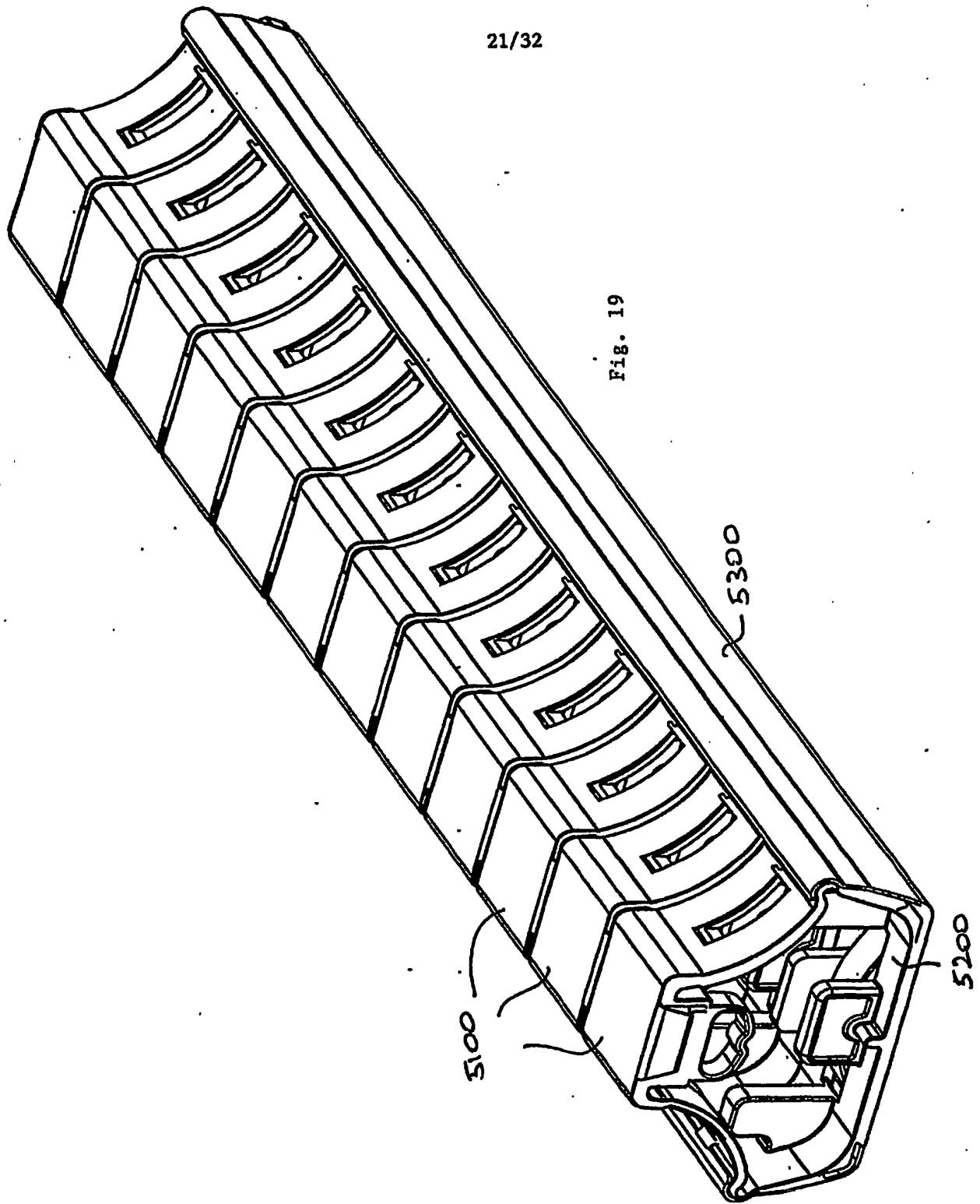
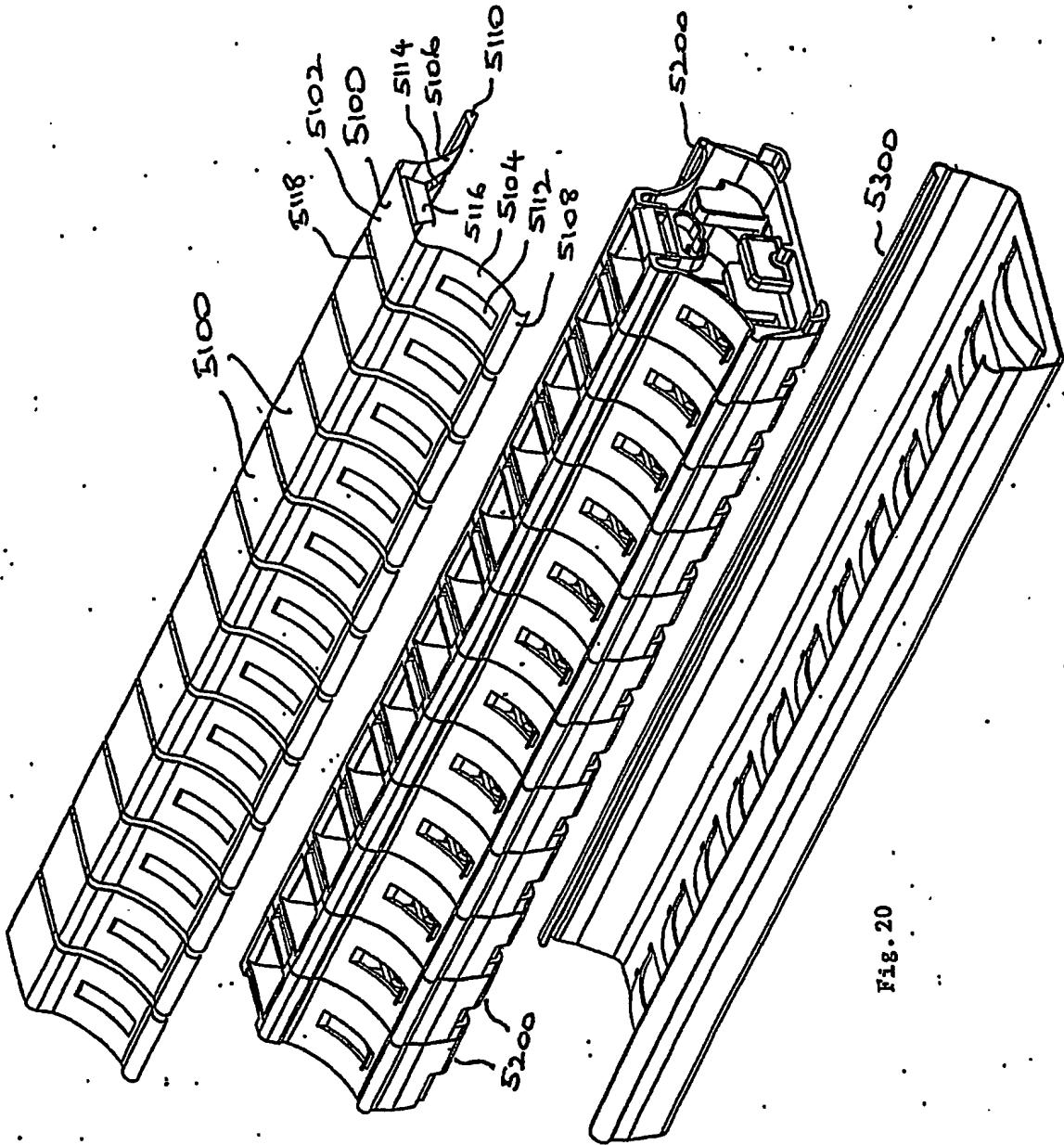


Fig. 18

21/32



22/32



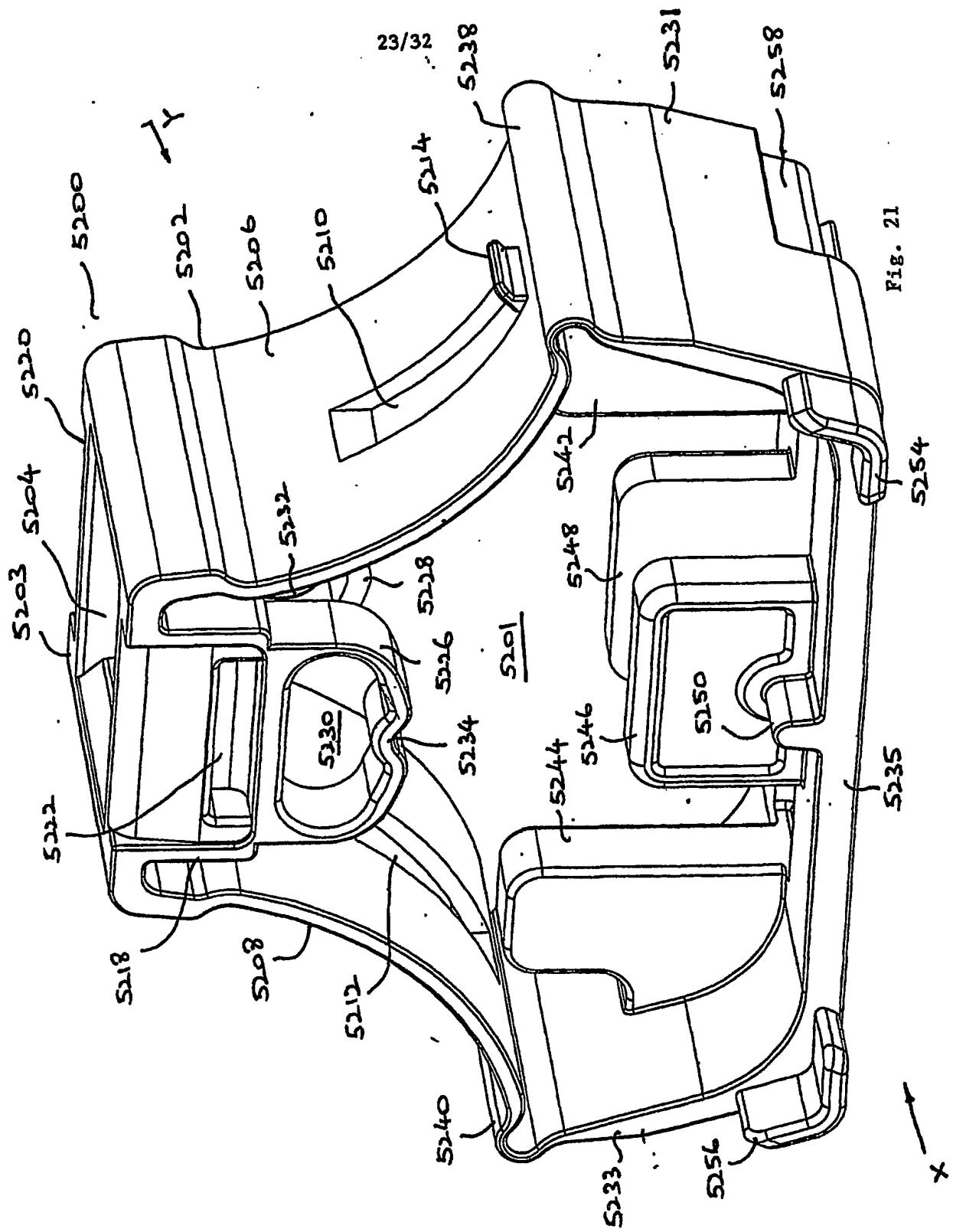


Fig. 21

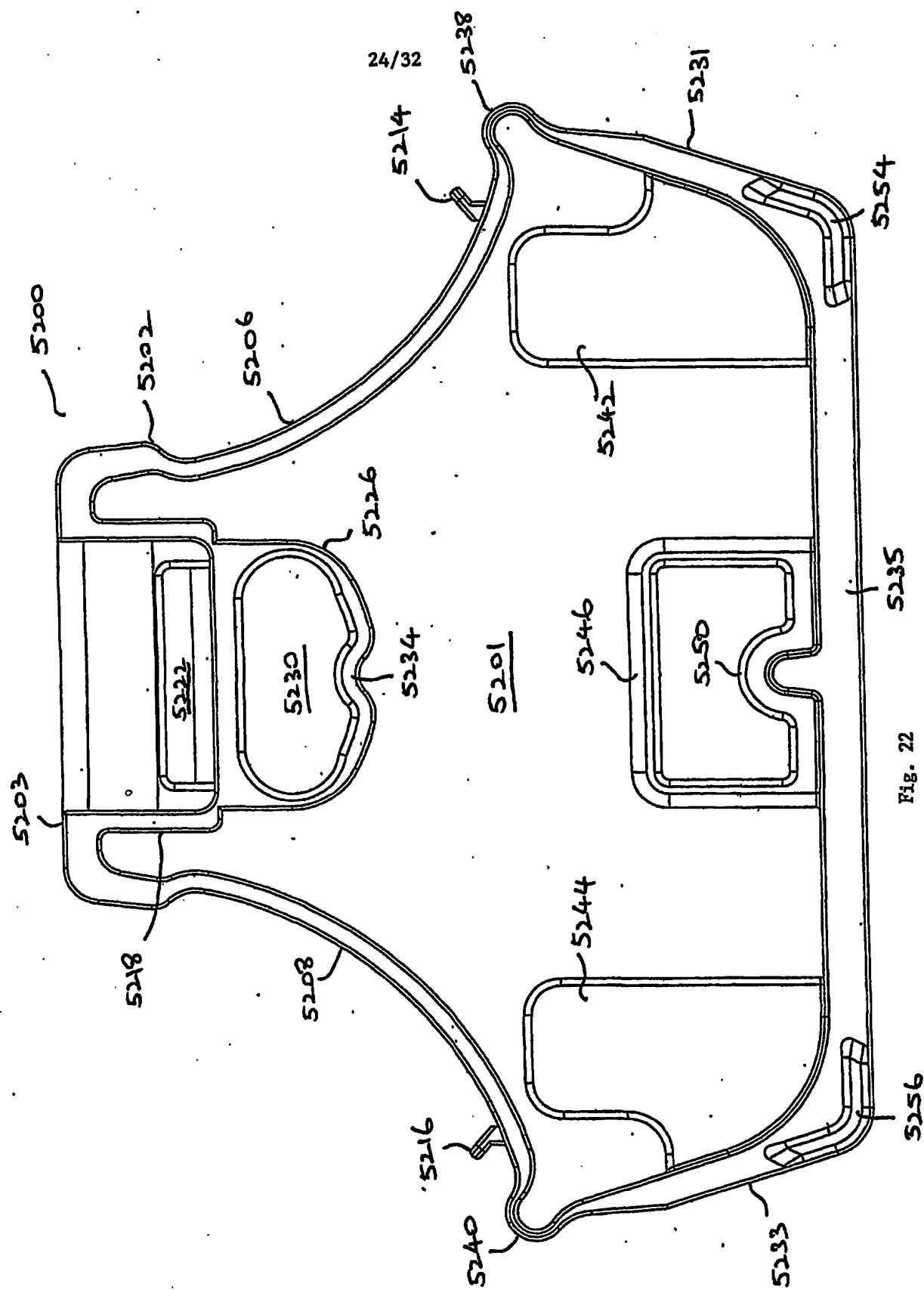


Fig. 22

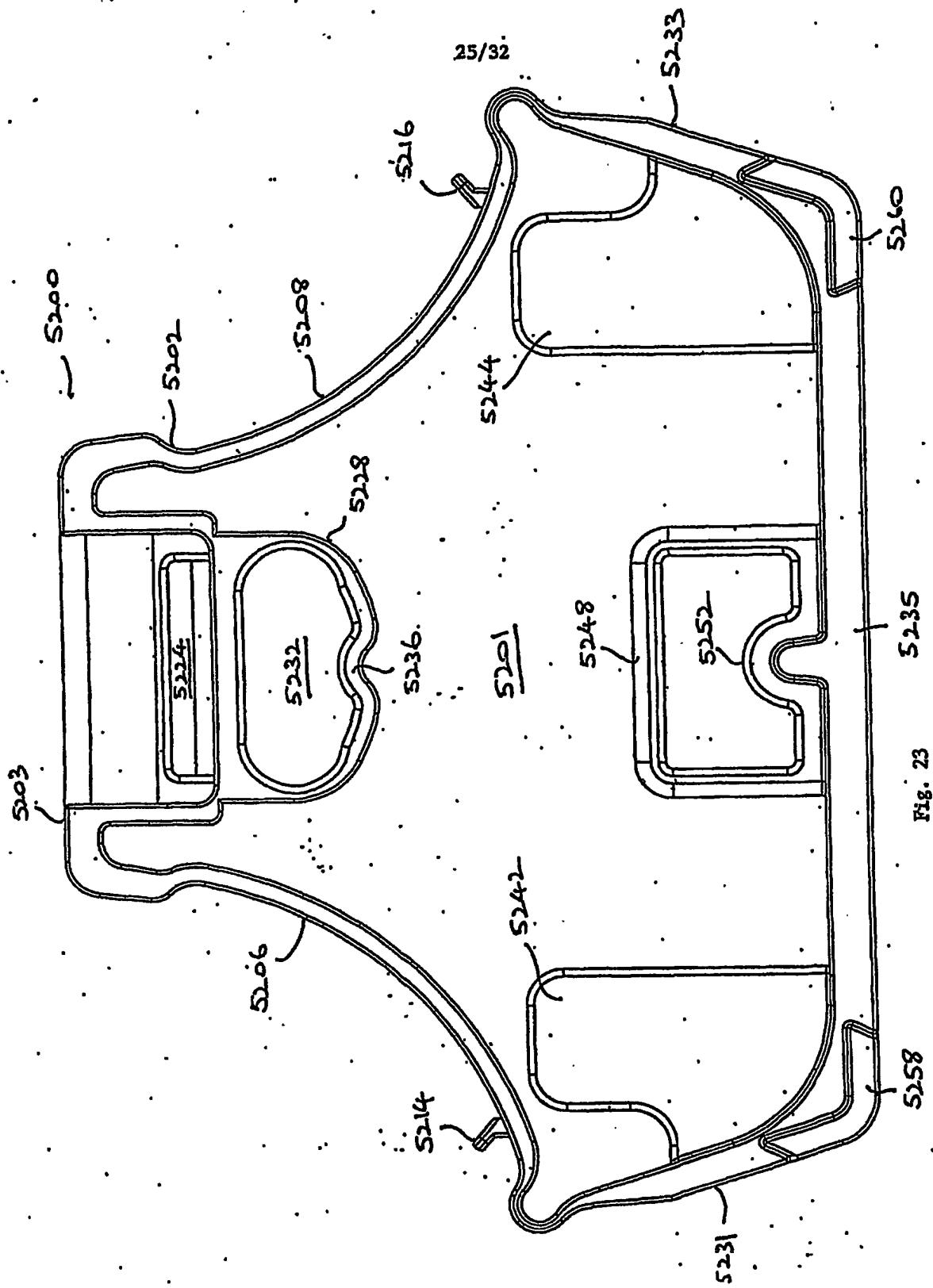


Fig. 23

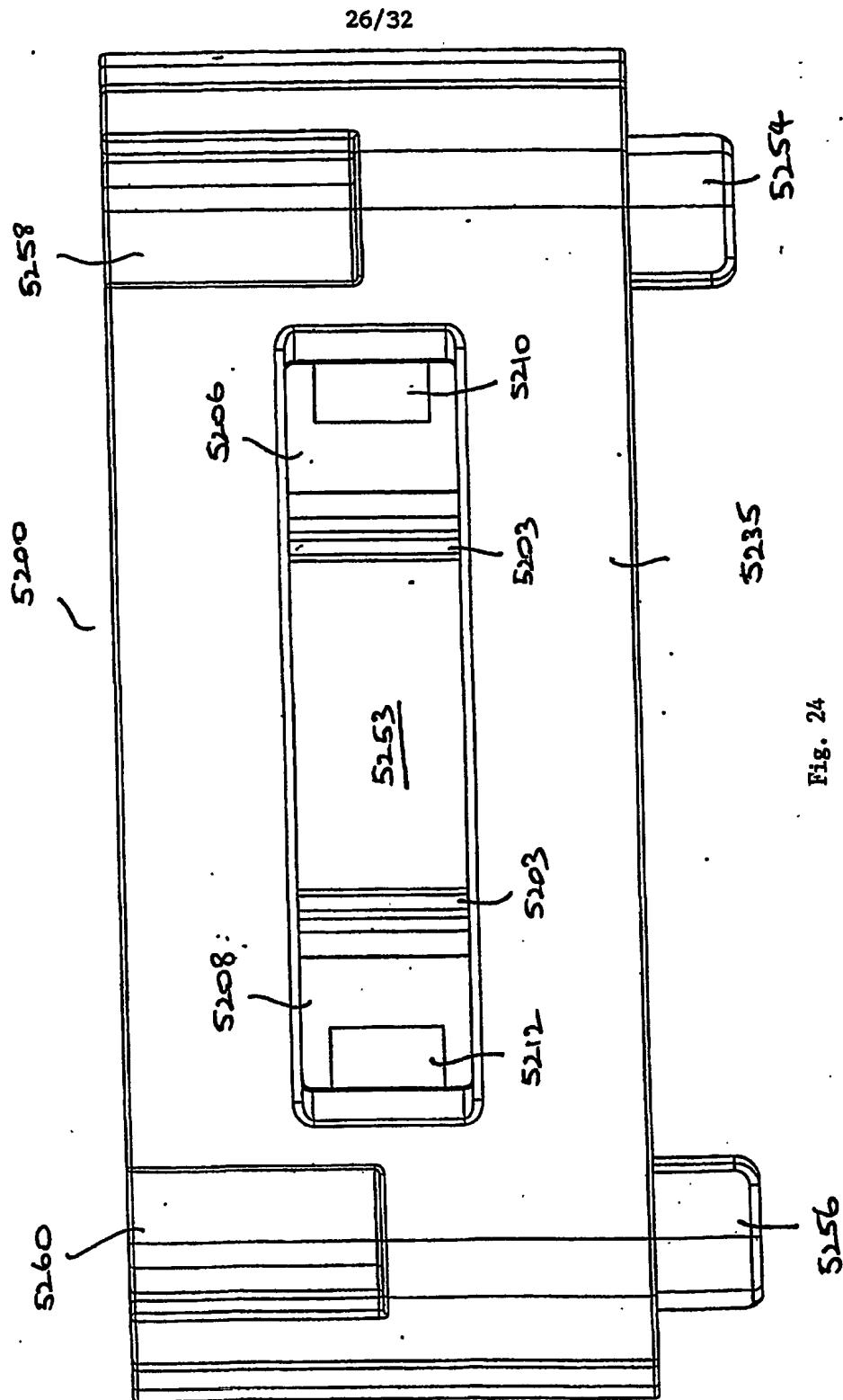


Fig. 24

27/32

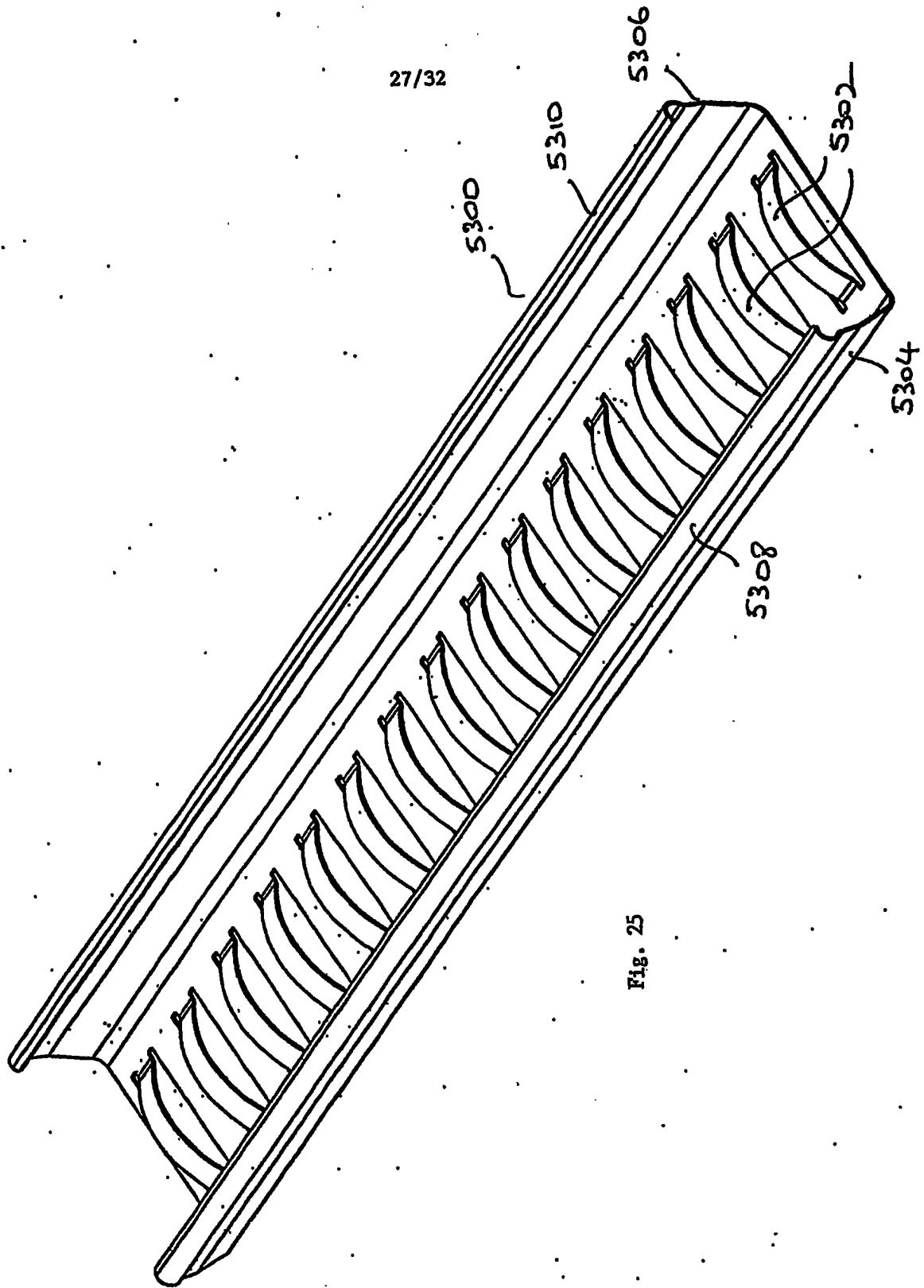


Fig. 25

28/32

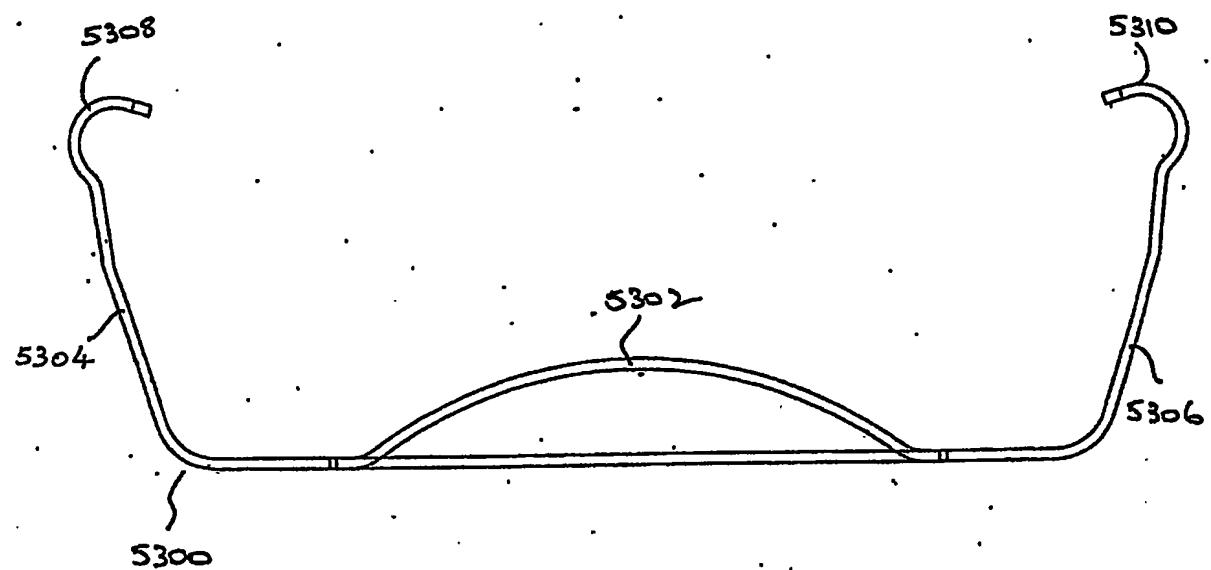


Fig. 26

29/32

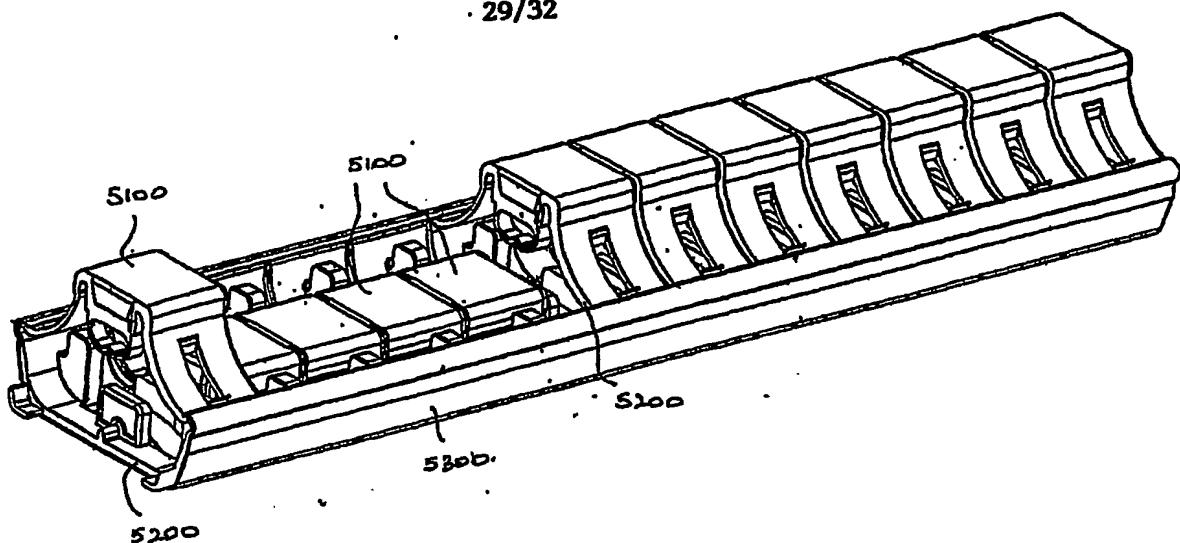


Fig. 27

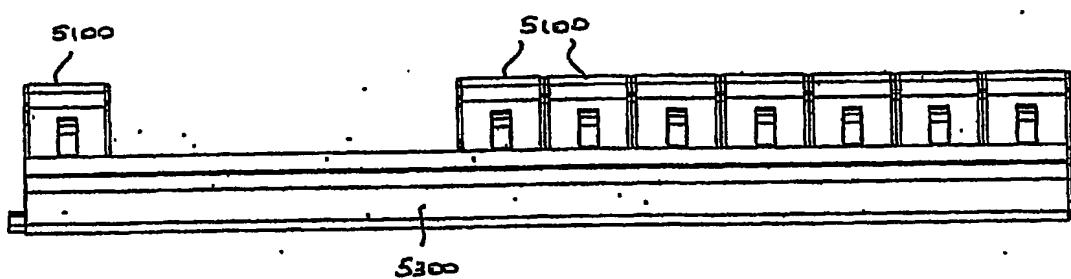


Fig 28

30/32

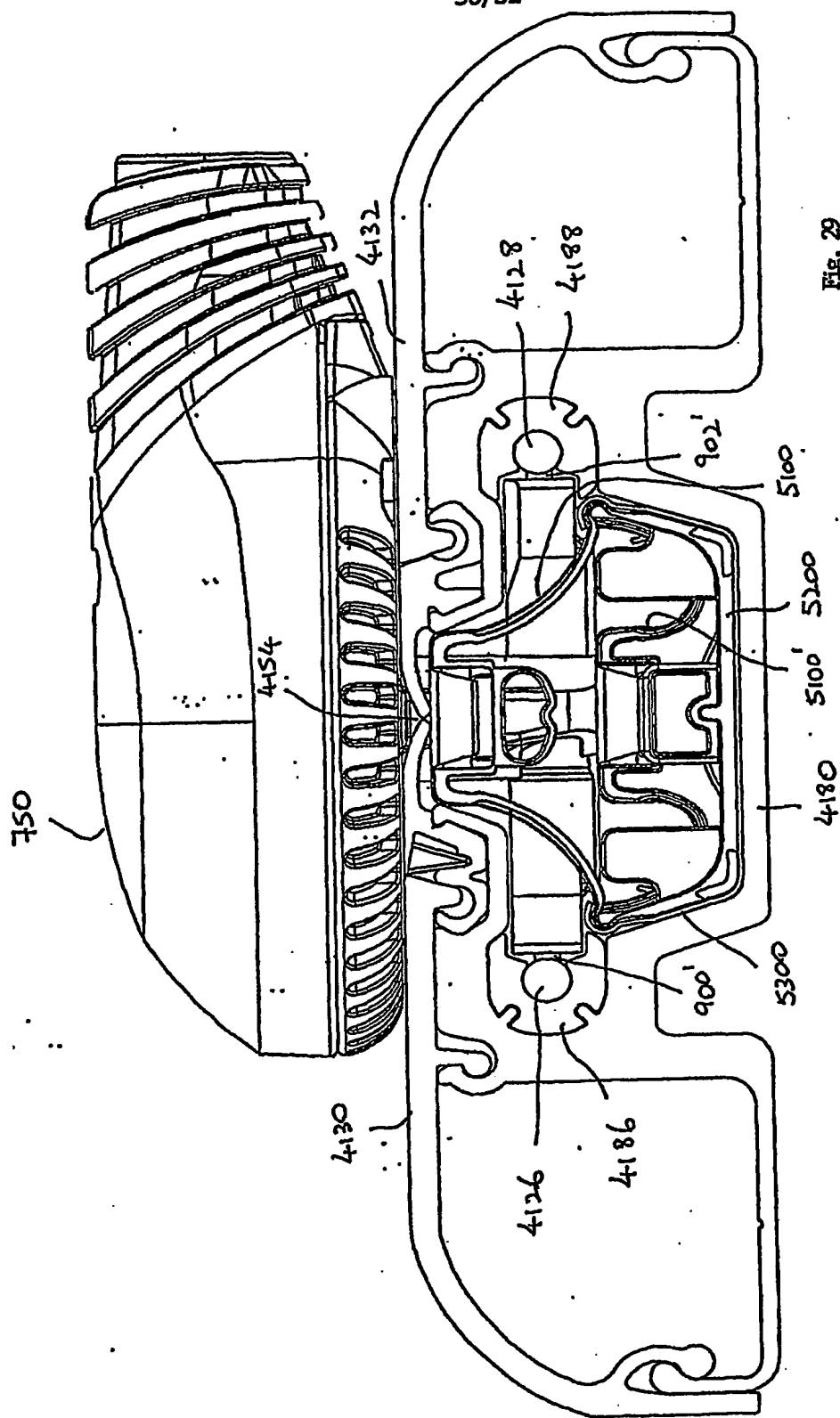


Fig. 29

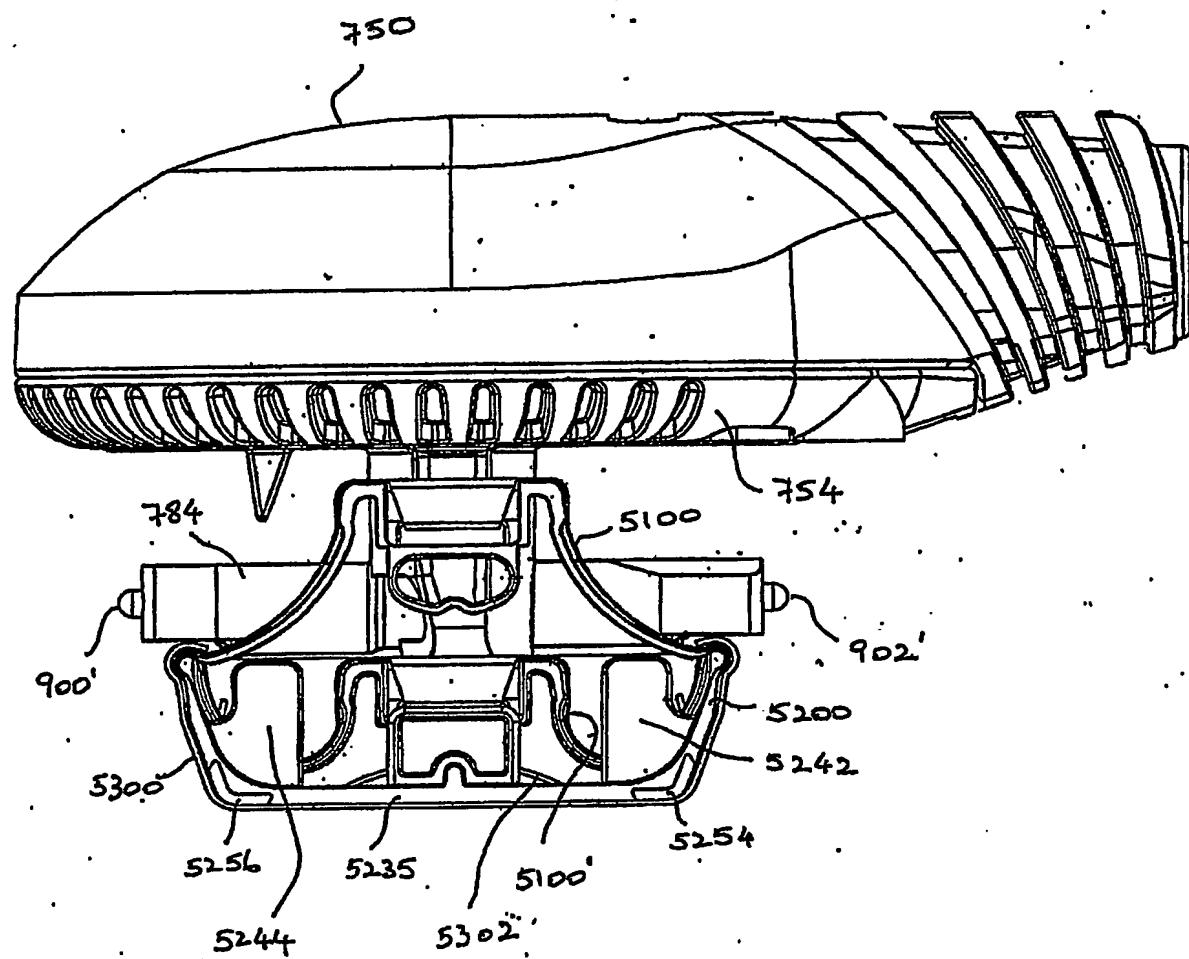
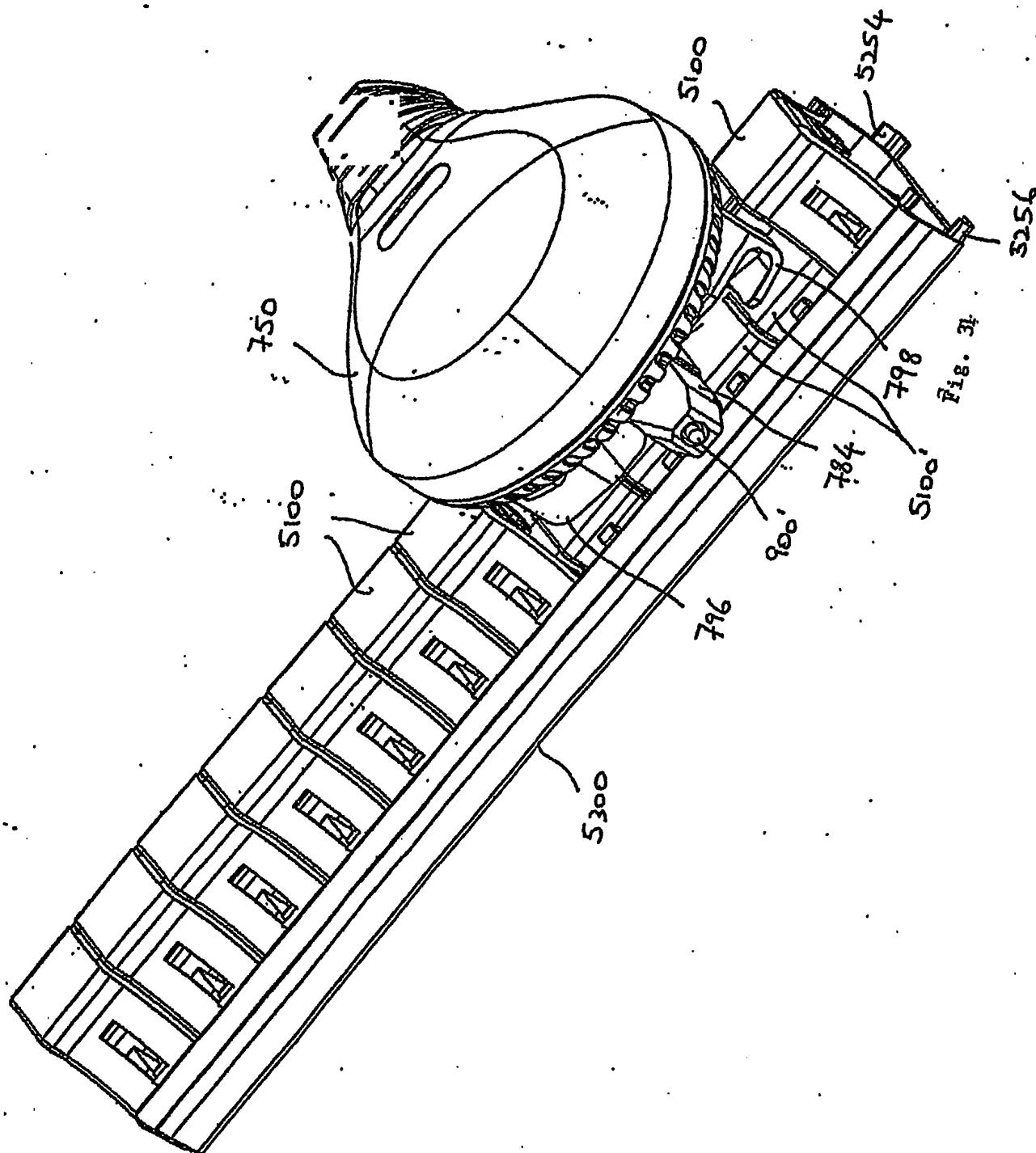


Fig. 30

32/32



Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)
The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

**Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv))
for the purposes of the designation of the United States of America:**

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ SG2004/000023 (if furnishing declaration pursuant to Rule 26ter).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications:

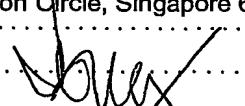
I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: YONG Choon

Residence: Singapore
(city and either US state, if applicable, or country)

Mailing Address: c/o Nutek Private Limited
39, Joo Koon Circle, Singapore 629105

Citizenship: Malaysia


Inventor's Signature:
(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date: 19 July 2004
(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

Name:

Residence:
(city and either US state, if applicable, or country)

Mailing Address:

Citizenship:

Inventor's Signature:
(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent)

Date:
(of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.